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CIO

THE MAGAZINE FOR INFORMATION EXECUT

COVER STORY

The Latest News On Managing LANs

What Do Users Really Want?

The Washington Post Co.'s Gary Dingboom

AN INTERNATIONAL DATA GROUP PUBLICATION

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CIO

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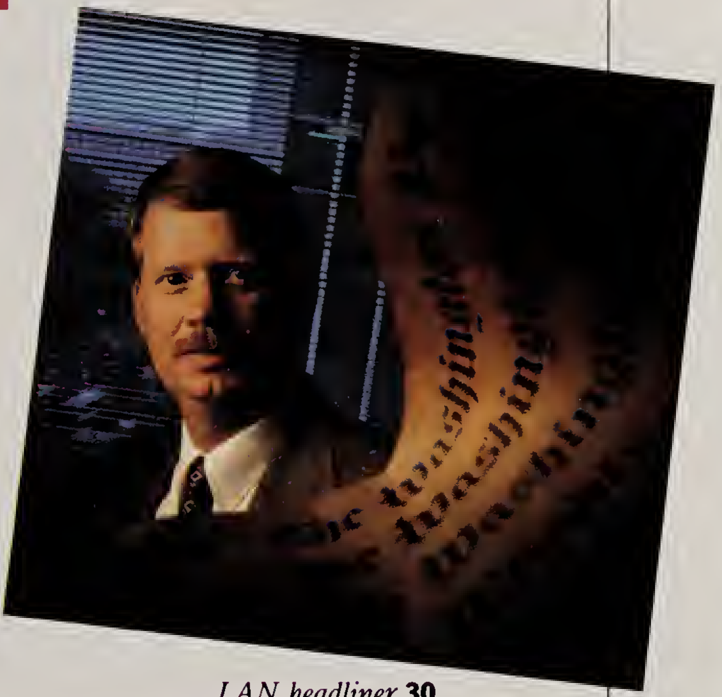
COVER STORY

The Lay of the LAN 30

Few organizations have the luxury of inventing their LANs and their LAN-management schemes simultaneously. So real-world solutions require improvised patchworks of commercial tools and homegrown ingenuity.

By Leslie Goff



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By David Freedman

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VeriFone's information systems don't merely reflect the company's distributed structure; they virtually defined it.

By David Freedman

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A consortium of IT vendors is proving that the spirit of cooperation lives, even in the super-competitive world of U.S. industry.

By Megan Santosus

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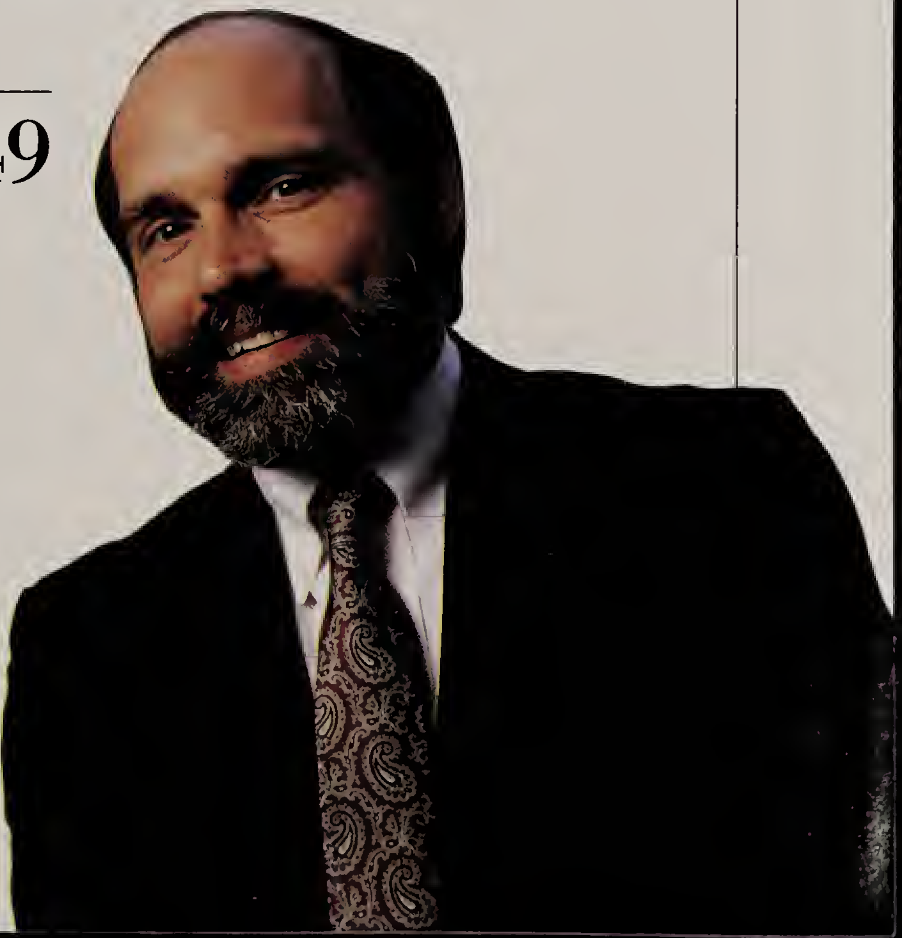

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With 1992 fast approaching, it's time for U.S. companies to start laying plans for the international networks they will need if they hope to compete in the European market.
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In this same study, developers were asked to compare IEF maintenance productivity with their former methods. Of those responding, *more than 80 percent had experienced gains of from 2-to-1 to 10-to-1.* (See chart.)

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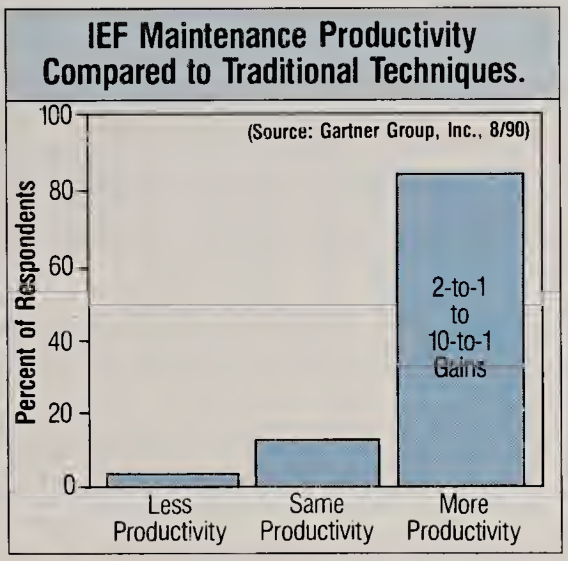

Developers were asked to compare IEF maintenance to former methods. Of those responding, more than 80% reported productivity gains of from 2-to-1 to 10-to-1.

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LETTER FROM THE EDITOR

Networks are becoming the skeleton of the corporate information infrastructure. Although one would assume that the skeleton is the most stable part of the system, this does not yet appear to be the case. Today CIOs are under a tremendous amount of pressure to devise network schemata that will serve their organizations in the years to come. But the art of networking is constantly evolving, and information executives must make choices knowing that the infrastructure they develop will be subject to sprains and cracks.

A case in point is how organizations are approaching the implementation of local area networks. In our cover story, "The Lay of the LAN," beginning on Page 30, contributing writer Leslie Goff outlines the network management problems facing six information executives. As one executive describes the dilemma, the desktop environment has 10 times the processing capability of the data center, but the power to unleash that capability is not yet fully operative.

Contributing to the LAN dilemma is the promise of open systems, as well as improvements in productivity and cost savings offered by downsized systems. Yet like the networking situation, there are no proven solutions for harnessing these opportunities.

The networking frenzy has certain echoes of the early 1980s, when "DP managers" were under similar pressure to introduce office automation. After much angst-producing debate, the most pragmatic of these CIO forebears threw up their hands and settled for cobbling together an eclectic system—a little of this and a little of that—as long as it worked. It did work, and has since grown more complex, sophisticated and capable (though considerably harder to manage). If experience is any sort of teacher, the dilemmas faced in creating networks will also sort themselves out in the future.

And now for something completely different. You will be receiving two issues of *CIO* this month and also in October and November. We have increased our frequency of publication to 18 times a year. In 1992 we will publish two issues a month in April, May and June, and September, October and November.

The second issue of each month will include our regular departments, columns and articles and will also feature a "Strategic Outlook" section that focuses on an important trend in information technology. This month's Strategic Outlook delves into open systems. Subsequent issues this year will treat outsourcing and managing change. We hope you enjoy our additional offerings. Please take the time to write and tell us your views on this new venture.

Marcia Blumenthal

PHOTO BY WEBB CHAPPELL

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Together, these speakers will address business trends, global economies, world events and technology – key issues that will influence your world now and in the years ahead. And, *CIO Magazine* Publisher Joseph L. Levy will focus on "The CIO's Expanding Role Through the 1990s and Beyond." These insightful discussions will set the stage for a multi-media presentation entitled "The IS Organization of the Future."

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LETTER FROM THE PUBLISHER

PHOTO BY GEORGE SIMIAN

Dear Executive:

The pace of the information revolution continues to accelerate. Applications that once could be performed only by a mainframe can now reside on your desktop workstation. And networking technology—including the latest in local area networks, highlighted in this issue—is making it easier to share information between departments, across town and around the world.

Networking has the potential to revolutionize the way business is conducted in the '90s, much as personal computers and workstations revolutionized the '80s. The ability to share information with the right people at the right time can produce dramatic new benefits and bottom-line results. With this powerful technology, an organization's workers can move far beyond simple productivity gains to become more *effective.*

Read on to learn how many companies are already capitalizing on LAN technology to increase their knowledge, the effectiveness of their people and the power of information within their organizations.

P.S. Limited space is available for this month's CIO Perspectives Conference, "IT and the Corporate Agenda: People, Productivity and Profit," to be held Sept. 22–25 at the Hyatt Regency in Monterey, Calif. To ensure your place, please call our toll-free registration hot line at 800 366-0246.

Coming In CIO

Strategic Outlook: Open Systems

With our second September issue, *CIO* introduces a series of special outlook sections exploring issues of strategic importance to our readers. We begin with a look at open systems, a mixed blessing for companies that have painted themselves into a proprietary corner or find themselves saddled with a hodgepodge of incompatible systems. Building systems around industry standards sounds like a smart alternative—except no one can figure out just what constitutes an industry standard. *CIO* examines the advantages and obstacles to changing over, looks at the various contenders for the standards crown and profiles a company that is using its unsuccessful early experience with Unix to embark on the road to true open systems.

A Cotton Tale

After years of treating each other like boll weevils, cotton growers and merchants are getting along and harvesting better-than-ever profits, thanks to an advanced distributed computing network called Telcot.

Town and Gown

Universities with IS graduate programs are forming partnerships with companies that theoretically should benefit both sides. Representatives from business and academia discuss whether such alliances are making the grade.

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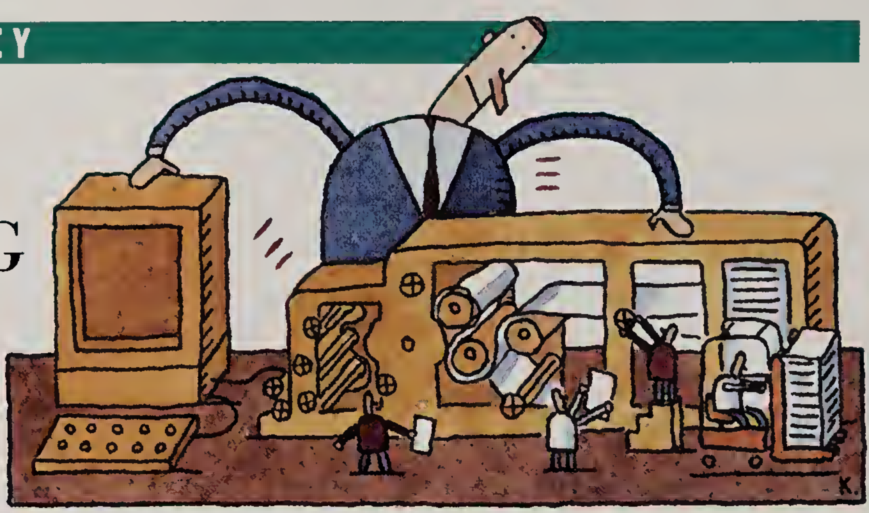
TRENDLINES

TECHNOLOGY SURVEY

A Passion For Printing



Printing technology has evolved from an in-house convenience to a strategic business tool, and those who manage it want more of it, according to a recent survey by Xplor International. Three-fourths of the respondents said that their organizations used printing technology in a strategic fashion, and 58 percent would like their organizations to have more printing power.

Most of the power they now have goes into printing compound documents—documents assembled electronically from a variety of sources, such as graphics, text and data files. These pieces (mostly bills and policy printing) are flying out of the hoppers at a rate of more than 1.2 million impressions per month per respondent.

Color appears frequently on the respondents' wish lists: Forty-five percent said they could use a spot-color printer in the next 12 months, and 16 percent cited an immediate need, especially for billing, direct mail and policy printing. Most said that a $225,000 price tag for a 100 page-per-minute spot-color printer was too high, but 73 percent thought being able to save money on preprinted forms or match their corporate logo colors would justify the cost.

As for standards, respondents were undecided about using IBM's proposed System Application Architecture. Only 36 percent said they were committed to this architecture; among those with IBM or plug-compatible mainframes, 41 percent intend to adopt it. Asked about their preference for a font standard, 32 percent of respondents said the industry should standardize on bit-mapped fonts; 27 percent preferred an outline standard and 41 percent didn't know.

Xplor International, a Palos Verdes Estates, Calif., professional association, conducted the survey of more than 300 electronic-document printing professionals from corporate data centers and electronic service bureaus.

Oliver with a Twist

Employees at Levi Strauss & Co. no longer have to track down a human resources person if they want to keep track of their benefits. With OLIVER, a new on-line, interactive computer program, employees can access up-to-the-minute information on benefits, compensation, and training and development programs right from a PC.

Developed by the company's benefits and IS departments working with an outside consulting firm, OLIVER (On-Line Interactive Visual Employee Resource), offers employees more than 500 computer screens of information. In addition to keeping tabs on various accounts, OLIVER can also project the value of investments at the time of an employee's retirement. According to Levi Strauss, OLIVER is unlike other such programs because users don't need to enter data (for example, date of hire and salary) in order to access their personal information. The 1,700 employees at company headquarters in San Francisco need only enter their personal identification passwords to put the human resources department at their fingertips.

Networking Sweet and Simple

On the cutting edge of big systems design comes Digital Equipment Corp. of Maynard, Mass., with an award-winning group of small, low-end networking products. The DEChub, DECserver 90L and DECbridge 90 is a modular networking system featuring a 10-slot board that can be mounted on a wall or in a closet and snaps together in minutes. The products recently took the gold in the 1991 Industrial Design Excellence Awards (IDEA), which are presented by the Industrial Design Society of America and sponsored by *Business Week*. The system's easy assembly relies on a patented handle that allows connection without tools or cables. Colors, shapes and textures are used to simplify a normally complex installation. Sort of like GarAnimals for network managers.

CONSUMER RETAILING

Getting Clothier to Their Vendors

You've heard the stories about Nordstrom sales reps rising from sickbeds to deliver packages to the homes of regular customers. Well, Nordstrom's drive for service is not limited to the customer, it seems. The Seattle-based specialty fashion retailer recently announced V.I.P. (Vendor Information Partnership) Express, an electronic-messaging network and voice service designed to facilitate communications among more than 20,000 vendors and thousands of Nordstrom employees.

Developed in partnership with MCI, V.I.P. Express will enable vendors to dial into the Nordstrom mainframe to verify the status of purchase or-

ILLUSTRATION BY JAMES KACZMAN

TRENDLINES

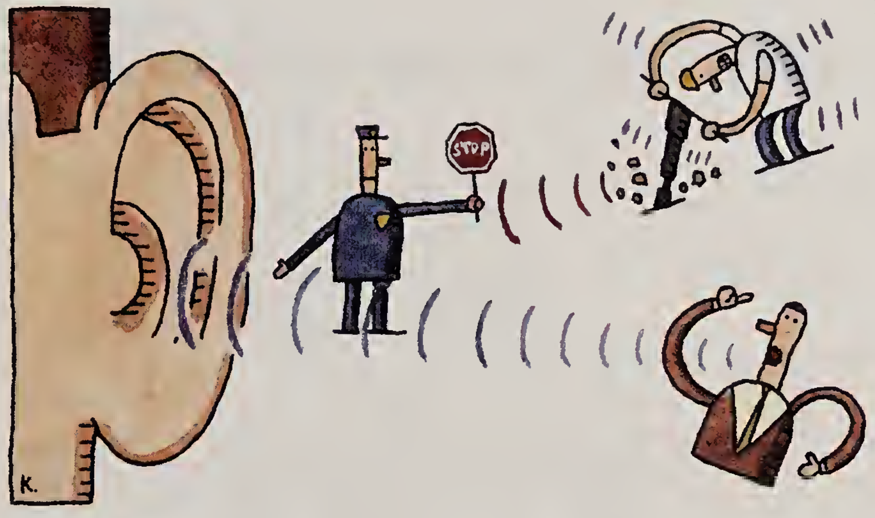
ders, shipping dates and invoice payments. The electronic-mail link features a customized version of MCI Mail's PC package Lotus Express. Nordstrom will continue to rely heavily on its trademark person-to-person communications but hopes that this additional communication mechanism will allow vendors to work more efficiently with the stores.

According to Patrick Adkisson, V.I.P Express project manager, Nordstrom currently uses a mainframe-based E-mail system with more then 3,000 active mailboxes and sends in excess of 3.5 million messages a year. "MCI Mail will allow us to extend the strategic use of our internal electronic-mail system to our vendors," he said. "I believe that in first establishing this open-ended, easy-to-use and inexpensive . . . connection to our vendors, we will quickly realize many more business benefits and opportunities than we would with just a traditional electronic data interchange approach."

In typical Nordstrom fashion, the service doesn't end there. To encourage vendors to use V.I.P. Express, Nordstrom and MCI will also offer them discounted long-distance rates for all of their business calling. ▬

NOISE ABATEMENT

MAKE A JOYFUL HUSH



CIOs concerned with clatter on the factory floor or disturbed by the din of the data center may someday be able to silence the cacophony with anti-noise technology. Stamford, Conn.-based Noise Cancellation Technologies Inc. (NCT) has harnessed "anti-noise" sound waves, which are the opposite of normal sound waves in structure. When the two waves combine, one's peaks cancel the other's valleys, and silence prevails.

NCT, in conjunction with such partners as Chrysler Corp., CSX Transportation and Siemens Medical Systems Inc., is building anti-noise technology into automobile and stationary mufflers, industrial fans, medical diagnostic machines, aircraft cabins and household appliances. The company is also developing headset- and seat-based noise reduction systems for use where a variety of noises are present.

Active noise control was discovered in the 1930s, but implementation of the theory proved difficult. The advent of microprocessors and faster computing speeds made it more feasible, and NCT acquired fundamental patents for the technology in 1986.

The firm's first silent muffler for stationary engines appeared last year. Loudspeakers adjacent to the noise source pumped out mirror images of the offending groan. The two waves combined and canceled each other out. The result was noise reduction 80 percent more effective than that of a traditional passive muffler, which relies on random wave cancellations within its baffled interior. The anti-noise muffler has since been implemented by CSX.

The NCT headsets under development can selectively silence undesired racket while still allowing the wearer to hear desirable sounds such as warning signals, conversation or music. Similarly, the Silentseat, which provides a zone of significantly reduced noise around an individual, can be programmed to cancel only selected disturbances. To avoid possible abuses, the seat will probably not have a setting for tuning out loud-mouthed coworkers. ▬

THE STATE OF THE STATES

Want to know what's up in state government IS circles? A new report from the National Association of State Information Resource Executives (NASIRE) provides a comprehensive look at the state of the states. The study, entitled "State Information Resource Management, Structure and Activities," covers organizational, managerial, human resource and financial trends. It also notes public service applications that have been developed under state auspices.

The report may be ordered from the Council of State Governments, in Lexington, Ky. Call 1 800 800-1910. Cost is $50, plus shipping, and a 30 percent government discount is available. ▬

GIGGLEBYTES

Whether deserved or not, CIOs and other high-tech computer types have a reputation for having all the comic depth of a bottle cap. After all, wit is not a high-priority job requirement for IS. For the punch-line illiterate, Allspice Productions of Madison, Conn., offers RASKAL, a software program chock full of racy jokes that run the gamut from farmers' daughters to randy bulls.

Allspice President Ginger Untrif promises that the 2,400 jokes included contain ample material to offend just about everybody. Andrew Dice Clay wannabes can easily find an appropriate—or inappropriate—joke by searching through the 15 categories (such as "The Act Itself," "Sick Jokes" or "Marriage") or 135 index entries (such as "drunks," "brides" or "divorce"). Phony word processing and spreadsheet screens can be called up to deflect unwanted attention. Of course, the sight of a CIO chuckling behind a computer could make anyone suspicious. ▬

ILLUSTRATION ABOVE BY JAMES KACZMAN, BELOW BY DIANNE BENNETT

TRENDLINES

LAW ENFORCEMENT

POLICE CLOCK RADAR RISKS

Radar is the speed demon's nemesis. Lead-footed motorists dread the radar-equipped patrol car that may lay hidden behind the next bridge or around the next bend in the road. But some police officials think cops may have more to fear from speed traps than speeders do—namely, cancer.

Traffic officers at two Florida police agencies—the Hernando County Sheriff's Department and the St. Petersburg Police—stopped using traditionally configured radar devices last March. Managers of the two departments were concerned about reports linking cancer incidence to long-term exposure to microwave emissions and electromagnetic fields associated with the devices. The antennae of these devices are usually mounted inside patrol cars. Both agencies have remounted the antennae in the light bars, and St. Petersburg police have discontinued use of hand-held radar.

"If the possibility exists [that the devices pose a health hazard], we don't want to take the chance," said Sandy Shields, a Hernando County police research analyst. Manufacturers of the devices counter that their wares are well within emission standards written by the American National Standards Institute. Shields says that her department's vendor has been "negative and rude" since the decision to remount the antennae.

But Samuel Milham, an epidemiologist with the Washington Department of Health—where a study tracking cancer incidence among a group of police officers is underway—said that the "circumstantial evidence [of a potential health problem] is interesting." Milham conceded that much more research needs to be done—and on larger populations of officers—before any conclusions can be drawn, however.

Controversy over the safety of radar devices erupted last fall, following a series of articles on the topic that appeared in *Law Enforcement News,* a publication of the John Jay College of Criminal Justice in New York. "After the articles came the feeding frenzy," recalled their author, Gary Poynter, who is a trooper with the Ohio State Highway Patrol.

To Poynter's knowledge, 17 police departments stopped using radar devices in the early months of this year, but most have since returned to using them. The Memphis Police Department, for instance, halted radar use for two weeks last March, while an independent testing agency evaluated the safety of hand-held radar units and other radar devices. The agency concluded that the emissions were within acceptable guidelines, and use of the radar resumed. Still, Poynter said that he receives daily calls from police officers all across the nation, many reporting on their cancers. ■

SMOKING OUT HOT COMPUTERS

With personal computers becoming increasingly "hot" commodities, some used-PC exchanges are finding themselves unwitting fences for nefarious agents. In March the Boston Computer Exchange discovered it had handled $20,000 worth of PC equipment heisted from New England schools and colleges. It happened again this summer at the New York-based National Computer Exchange. But this time the exchange intercepted the contraband, returned it to its rightful owner and earned a commendation for its diligence.

Les James, the National Computer Exchange's head trader, intercepted a Zenith Data Systems laptop reported stolen from the car of a CIBA-GEIGY Corp. employee and returned the unit to CIBA. Impressed with the exchange's security system, the pharmaceutical firm awarded James its Quality Recognition Award. This is the first time CIBA has bestowed its award on an outside organization.

ILLUSTRATION BELOW BY DIANNE BENNETT

The Exchange's security measures, including a national registry listing the make, model, serial number and owner of stolen computers, have been 100 percent successful in detecting stolen merchandise. ■

KEEPING IT ALL INSIDE

As the din over outsourcing mounts in the business world, network managers are quietly staffing up to handle LAN support internally, according to a recent report from Forrester Research of Cambridge, Mass. A survey of 50 Fortune 1000 network managers, "The LAN Support Paradox," maintains that, unlike "mature" technologies such as SNA and voice networks, LANs offer too much competitive potential for companies to turn them over to outside support groups. Network managers are undaunted by the complexity of networking multiple LANs, according to the report, and feel that internal support is cheaper, more responsive and allows tighter control than outsourcing. Nevertheless, these managers would call on outsourcers for help with complex design and installation—especially jump-starting new technologies, highly technical software support and maintenance, and local support of remote offices. In such cases the Fortune 1000 would prefer to buy support from a single provider. ■

There must be a reason why a company grows by 100% in just 4 years.

There must be a reason why MCI's 800 Service grew from 0 customers four years ago, to more than 100,000 today.

Customers seem to like how quickly we respond, as much as they like the quality of the response. And the fact that before we do anything, we listen. Listen to what the problems are.

MCI® has one of the world's most modern telecommunications networks, but the big reason we grew so far, so fast, is how we put it to work. For each customer.

MCI 800 Service℠ is always tailored to your company, not simply sold off the shelf or in packages that don't fit your needs.

Those needs can range from customer service to sales and marketing to internal communications. MCI 800 Services can be tailored to route calls to the right people and places, quickly. Either automatically, or by menu.

Peak loads can be planned for, overflow calls can be shifted automatically to other locations.

Calls can be managed by time of day, geography, product lines, zip codes, etc.

Your customers get their problems solved and your employees get the information they need quickly and easily. And changes in service can be quickly made on line—on your own or with MCI help.

We can help with fast installation when you need it as well. This can mean having MCI 800 service up in under 24 hours.

And if things go wrong—power failures, personnel shortages—emergency plans can be standing by. We know how critical your 800 service is to your business.

If you have international customers (or would like to), MCI can make your connections with 28 countries, and more are on the way. Toll-free calling can attract new customers, keep suppliers plugged in, and traveling employees in contact.

MCI 800 Service

24-hour installation for last minute needs.
Emergency backup and on-line control available.
Flexible call routing by time, geography, menu, department, zip code.
Significant cost saving/controls, along with unsurpassed quality.
International, national, regional, local.

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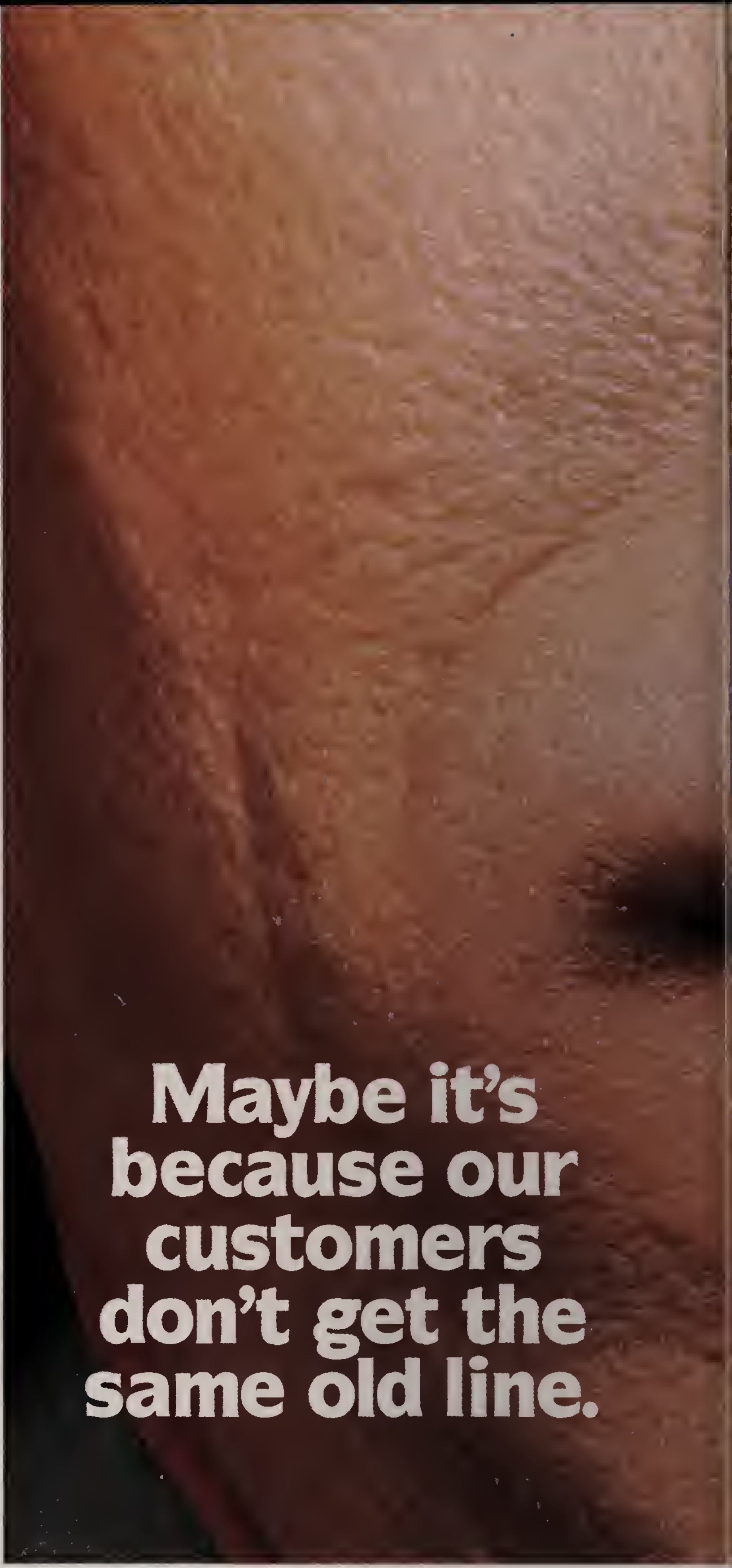
Beyond fast service from MCI, you can also look for comprehensive management reporting. Information that helps you control costs, build lead lists, track responses, and more.

MCI's spectacular growth has been based on delivering the value, the products, and the responsive people of MCI. And the quality and reliability of the entire worldwide MCI network. No wonder more than 100,000 companies have signed up with MCI 800 Service.

Call us and find out how fast we can move for you. Call 1-800-888-0800.

MCI®
800 Service

There must be a reason why MCI's Vnet business is 3 times bigger than it was 2 years ago.


Maybe it's because our customers don't get the same old line.

Instead of "take-it-or-leave-it," instead of "that's the way we do it," there's another way of treating customers. The MCI® way. A real alternative. Including MCI's Vnet,® where we can show you the advantages of virtual networking. In short, the benefits of a private network without the cost of a private network.

In just a short time, MCI has built the capability to handle whatever you come up with. Voice, data, video and fax. Vnet is provided over MCI's predominantly digital network, with a robust advanced signaling system, along with the superior network intelligence and control you're looking for.

It's state-of-the-art, and building. And that goes from building to building, continent to continent, end to end.

So, we have what you need, and we'll work with you to put together a network that fits those needs. Like: flexible dialing plans, customized routing and screening, on-line database management, switched data services, traveling employee access and network management.

In short, we have the features you want, and we can deliver them in short order.

And right on the money.

In fact, we've got an invoicing and reporting system that's the best in the industry. With the accuracy, flexibility, not to mention the timeliness, you need. Plus you're able to choose exactly where the information goes.

MCI Vnet Service

MCI Vnet is a predominantly digital international network.
Superior network intelligence, with robust advanced signaling.
Full capability, efficiency and flexibility.
On-line database management.
Superior invoicing and customized call reporting.

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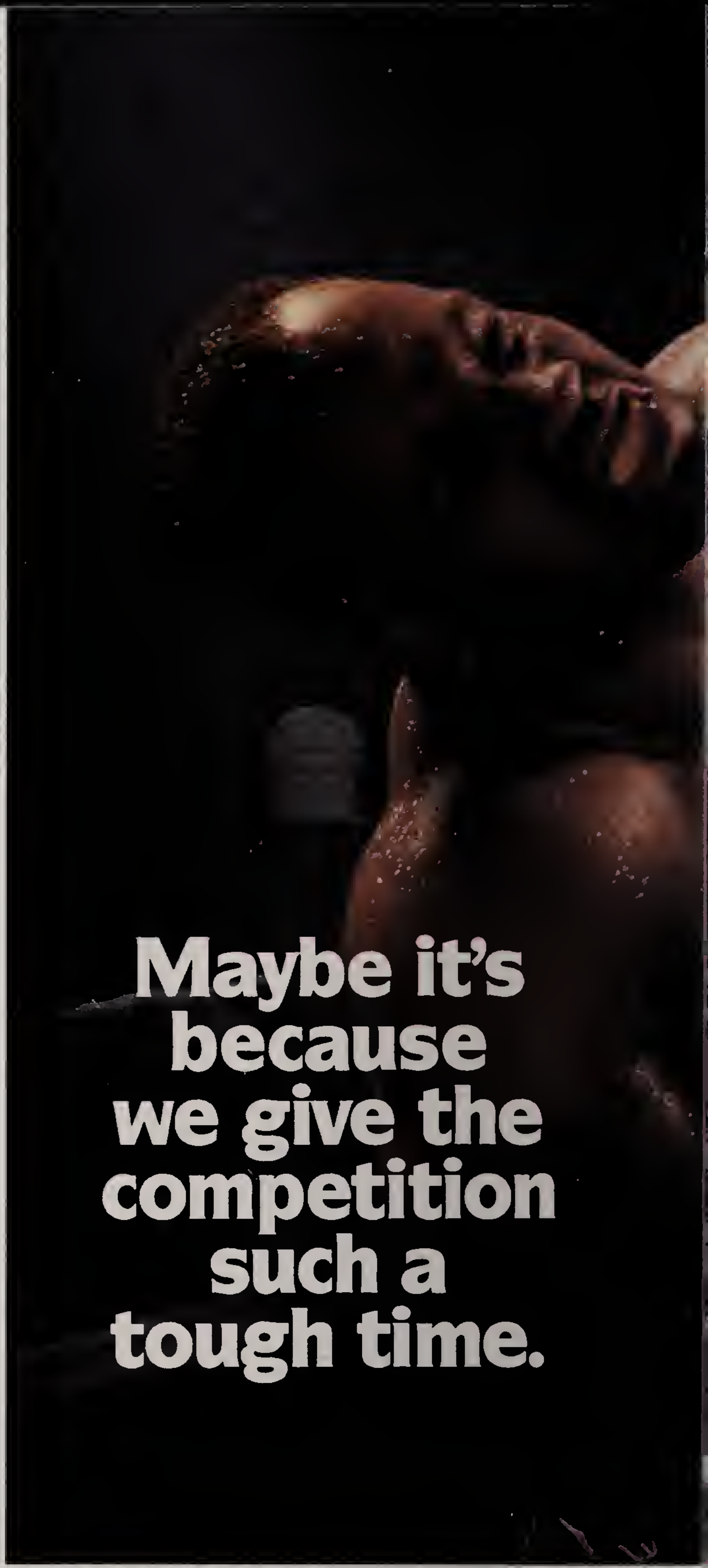
From minute detail to executive summary, everyone can get just the information they need to get a handle on costs.

All this on top of the fundamental quality, reliability and value of the MCI network itself. All brought home to you by the very responsive sales, support and service people who simply won't give you the same old line.

No wonder MCI's Vnet has made virtually hundreds of virtual network customers very satisfied. Why not join them? Call 1-800-888-0800.

MCI®
Vnet

There must be a reason why MCI's data customers have tripled their business with us since 1986.


Maybe it's because we give the competition such a tough time.

First MCI® shook up the industry in voice, and now—data. Along with an attitude that sets us apart from the other guys: we're easy on our customers, but mean to our competitors.

We're beating them to the punch by delivering high-speed Switched T-1 and Switched T-3 bandwidth on demand, whenever you need it.

But that's just the latest example of us working with our customers to develop flexible, high-speed, cost-effective communication services.

In fact, every day we handle everything from disaster recovery to time-sensitive fund transfers, to interconnecting LANs. All the while pushing for higher quality and lower costs. Like developing switched high quality video conferencing that's so affordable, it's actually useable.

We're also the first to install SONET—for even higher bandwidth and higher speeds. Operating at 2.4 gigabits per second, and carrying 32,000 simultaneous two-way data circuits on one fiber pair, MCI again is leading the way to new transmission pathways for data, voice and imaging applications.

Another MCI innovation is our Digital Reconfiguration Service,℠ so you can easily reconfigure your network or even add capacity, quickly and easily as traffic demands change.

No matter what, MCI people work with you

to put together the right technology, services, and creative solutions to meet specific applications.

And so that you're not trapped by technology or investments, these solutions can be adapted and modified as needs and times change, adding to their efficiency and value.

And this extends around the world. Because the MCI data network extends internationally to connect the U.S. to more than 250 countries. So you can make use of MCI's data network quality and reliability—worldwide.

And to continue to give the competition a hard time, we're keeping the pressure on them (and ourselves) to come up with more innovations.

Keep your left up, guys. Give us a call. 1-800-888-0800.

MCI Data Service

High speed, high quality, high tech.
Switched 56, Switched T-1 and Switched T-3.
SONET multi-gbps/32,000 simultaneous 2-way channels.
Full capability and flexibility—worldwide.

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MCI®
Data Services

There must be a reason why MCI® has grown so much. Maybe it's our more than one million business customers.

They discovered "the right choice" wasn't the only choice. Much less the best choice.

They called MCI.

For Data, Vnet and 800 Services. And more.

They found MCI had the products and services they needed.

They also found MCI people ready, willing and able to help meet their unique telecommunications challenges.

With answers that weren't off the shelf or off the cuff.

For more reasons why MCI could be the answer for your company, maybe you should call 1-800-888-0800.

MCI®

"The right choice" is a service mark of American Telephone and Telegraph Company.

TRENDLINES

FAST FASHION

Computer-Measuring Your Bottom Line

Does it matter if the inseam on your trousers is one one-thousandth of an inch too short? Probably not, but such nit-picking is the stock in trade of custom clothier Albert Andrews Ltd., which makes over 40 similarly minute body measurements to dress executives for success. To achieve this exactitude and speed up service for busy clients, Albert Andrews has traded tape measures for laptop computers and modems.

The Boston-based shop developed a computerized tailoring system that can deliver custom garments in half the time and at half the price of traditional custom clothing processes. "We feel we have incorporated science into the art of tailoring," said spokeswoman Barbara Feldstein. The firm is now negotiating franchises for the system, developed in-house five years ago with input from master tailors.

Company sales agents lug laptop computers along with thick books of clothing styles and material samples to the offices of male and female executives too busy to shop around. A patented measuring scale that resembles a robotic coatrack goes to work on your body, determining your measurements and sending them directly into the attached computer. The direct link eliminates error: Rather than 61, your neck will be logged in as 16 (and three-thousandths of an inch).

From the laptop, the data travels via modem to a Cleveland factory, where computerized pattern makers and cutters take over. Four to five weeks later, your agent returns with a hand-finished custom outfit for a final fitting. "Maybe 80 percent of customers don't need changes at this point," Feldstein estimated.

Prices, despite the efficiencies of computerization, are hardly of the off-the-rack variety. Albert Andrews men's suits cost an average of $500 to $1,500.

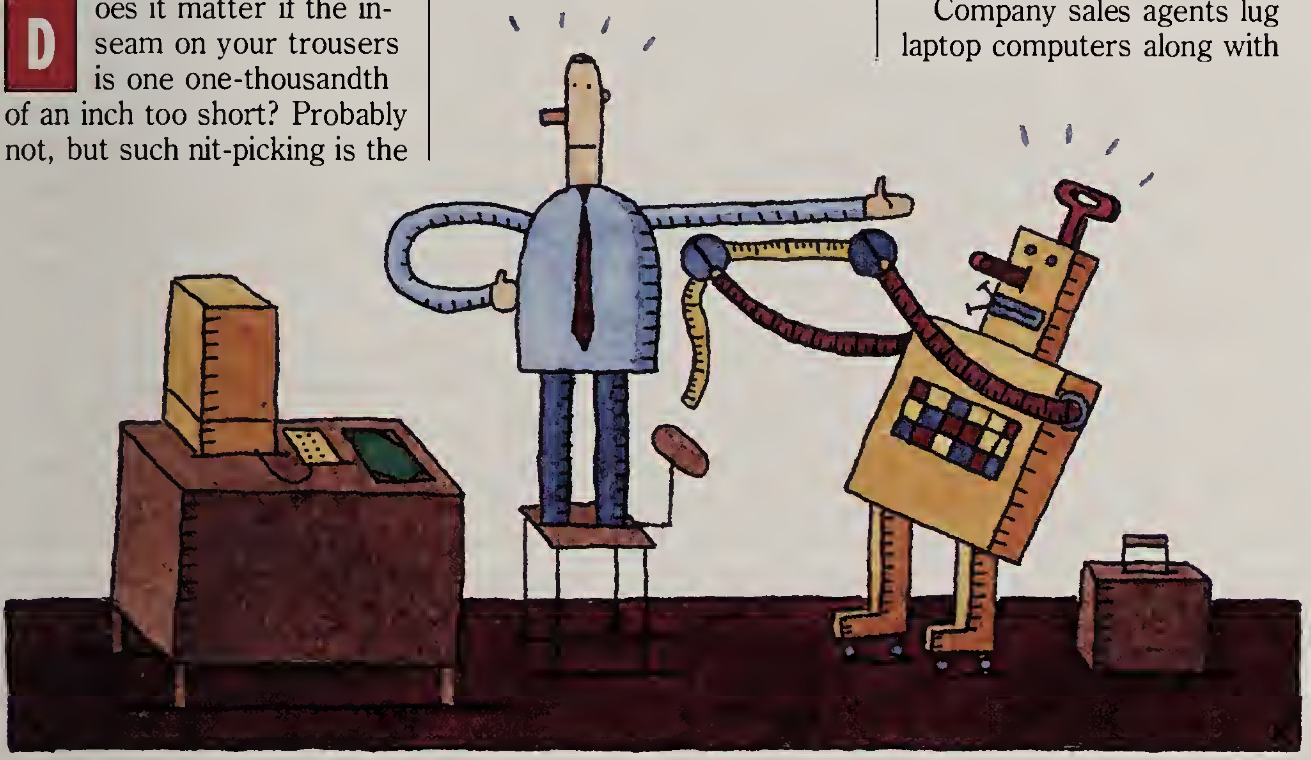

ILLUSTRATION BY JAMES KACZMAN

Buddy, Can You Spare a Rhyme?

We were inspired by an item in the *Wall Street Journal* about the occasional intersecting of poetry and the business world. (For one, the fine poet Wallace Stevens was a top-level insurance executive who purportedly composed poetry in his head while walking to work in Hartford.) And we were led to wonder whether there are any poets among our readers.

Yes, the IS profession tends to be regarded as doggedly practical, analytical and concrete. But who can say for certain that some CIOs are not moved by the underlying drama and compelling metaphor of information technology, the bloodlike flow of ones and zeros, the openings and closings of binary opportunity? If you are that CIO, we would be interested in seeing your poetry. Object? To publish your work and reward you with one of our coveted, understatedly lyrical, mugs. Send entries to: Poetry Contest, CIO Publishing, P.O. Box 9208, Framingham, Mass. 01701.

Florida Reprieve

Mike Hale, the Florida state government CIO who penned the recent *CIO* column on winning over top executives to the merits of IS ("Managing the Managers," June 1991), has to win over a new administration to the merits of his CIO-100 winning agency.

Soon after taking office, Gov. Lawton Chiles proposed the elimination of Hale's Information Resource Commission. The IRC's functions, along with six of its 17 members, were to be absorbed into the governor's planning and budget office. The plan sought to answer complaints from some state agency officials that the IRC was imposing unnecessary bureaucratic restrictions.

However, the Florida legislature's governmental operations committee supported the IRC's continued existence. Legislators argued that the governor's plan did not ensure that the state's information needs would be met and cited the need for long-range IS planning. They also praised the IRC for providing technical assistance to agencies, while saving the state $68 million a year on average by reviewing state agency IS budget requests.

As a result, the IRC will remain an independent body reporting to both the governor and the Florida Cabinet. Still, said Hale, the IRC has to work at improving its image, so that it is viewed as a "resource to make the state better, and not a bureaucratic hurdle."

Networking Made EC

With 1992 fast approaching, it's time for U.S. companies to start laying plans for the international networks they will need if they hope to compete in the European market

BY GEORGE FRYLINCK and THOMAS LAMOUREUX

The European Community, a confederation of 12 Western European nations, is becoming a reality. Moreover, all indications are that there will be an economic alliance between the EC and the six nations that make up the European Free Trade Association.

This emerging entity, sometimes referred to as the European Economic Space, will represent a unified market in which American companies must participate in order to survive. Many are already doing so. The Commerce Department estimates that the direct U.S. investment in Europe rose 16 percent in 1989 to an estimated $176.1 billion. And as noted by Ronald Freeman, managing director of Salomon Brothers Inc. in London, "Even the dimmest witted American companies are realizing that 1992 gets closer every day, and that it will have consequences for their businesses."

As their companies formulate or finalize plans for increased participation in the European market, corporate information personnel will be called upon to supply the data and information that are essential to success. IS in turn will increasingly rely on international telecommunications networks—those providing telecom services and those responsible for designing, operating, maintaining and using them. Never has information been more critical as a strategic business weapon.

ILLUSTRATION BY KEVIN HAWKES

But building an international network to support information exchange poses challenges that tax the most sophisticated telecom professional. IS and telecom professionals need to work together to build a European network that supports their companies' ventures abroad.

In 1987 the European Community Commission (ECC), the executive entity that administers the laws and regulations of the European Community, issued a position paper calling for the restructuring of the continent's fragmented telecommunications marketplace. In general, the paper calls for the introduction of Europewide competition to lower costs and speed the introduction of new technology. It also removes the barriers that currently prevent the formation of a larger European market, so that European business may achieve the economies of scale necessary to compete in the larger global marketplace. These same barriers have applied to American companies doing business in Europe.

While this is good news for information and telecom management operating or planning a European network, in fact the provisions of the position paper will not miraculously materialize on a pan-European scale on Dec. 31, 1992.

Many of the recommendations are being opposed by certain of Europe's telecom administrations (called Postal Telegraph and Telephones, or PTTs). Indeed, the EC Commission is confronting serious legal challenges from four Common Market countries to its directive ending carrier monopolies and is having difficulty winning full support for Europewide standards. Such standards are needed, because although the European national networks are largely based on internationally established recommendations, technology and specifications can vary from country to country.

But there are factors other than the position paper directives that are helping to edge the more reluctant administrations into the '92 frame of mind. One is national interest. Countries that do not offer liberalized telecommunications laws and competitive pricing may find themselves at an economic disadvantage as international commerce gravitates to those countries that do. Many countries are beginning to see the writing on the wall. For example, recently there have been significant decreases in transatlantic and pan-European leased-line rates by the PTTs, partly because of competition and partly because users are clamoring for rates that more accurately reflect the cost of providing the services. And it is becoming increasingly evident that the trend toward opening the market for resale of spare capacity, along with competition in such services as mobile radio, satellite and fiber-optic communications, could overtake the provisions of the position paper.

Rapid advances in equipment and transmission technology are also making an impact, but there must be faster reaction by standards-setting organizations. Addressing this concern a few years ago, Jonathan Solomon, director of corporate business development for Cable and Wireless PLC, a London-based telecommunications carrier with global operations, noted that the pace of international standards-setting must catch up with the pace of technological change if users are to enjoy the benefits of uniformity.

While liberalized telecommunications laws and technological advancement each are having a substantial impact on European networks, competition will be the strongest force behind balancing tariffs and the introduction of pan-European networks.

Such networks are already under discussion. In England, for example, the postal system telecommunications network has been proposed as the backbone for a third national carrier. And the railroads of 11 European countries are studying a plan to provide a shared data network, called the Hermes network, in competition with the PTTs.

Countries that do not offer liberalized telecommunications laws and competitive pricing may find themselves at an economic disadvantage.

To this broth is added a further ingredient that can make it difficult for American companies to participate fully in the EC or the European Economic Space: restrictions on the transborder transmission of personal data (see "Fear of Prying," *CIO*, June 1991). Many European countries, most notably Germany, place strong restrictions on the international flow of personal and financial information, including personnel records, bank statements and even mailing lists. Such restrictions inhibit efficient multinational information management. However, the concerns behind such restrictions must not be minimized. International networks should be closely monitored for security, and encryption procedures should be employed wherever possible to foil intruders. Both concerns are being addressed by the EC.

It is evident that in spite of position-paper directives, companies wishing to build networks to support their ventures in the EC must be prepared to accommodate (decreasingly) different rules and regulations as well as varied service quality standards. At present, no European carrier is offering the full menu of services U.S. businesses enjoy.

Complete service packages marketed here under names such as Virtual Private Networks, Software Defined Networks and Vnet, which use the public switched telephone network to provide "virtually private" network services, are either not available or are of limited availability abroad. And only the United Kingdom is seriously considering permitting carriers to resell voice service, meaning that all users must go through the PTT to access the particular country's public telephone network.

There are varying regulations governing use of networks for international transmission of personal data, and in many instances specific approval must be obtained to install new or nonstandard equipment. And many countries still do not permit or offer facilities management services to house or maintain equipment off a company's premises.

Over the past few years the press has given extensive coverage to the challenges of managing international networks while at the same time predicting that the loosening of regulatory restrictions will boost international network deployment and make global networks a more powerful business tool for multinational companies. In short, there's no argument about the need for networks. The discussions center on putting them together.

With few exceptions, the general consensus has been that users should expect major delays in implementing such networks, and that the main cause for these delays has been the still-varied regulations of the countries that make up the European Economic Space.

Most experts caution that few

AS THE PACE OF CHANGE ACCELERATES,
HOW CAN YOU KEEP YOUR COMPANY OUT FRONT?

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If things are changing so rapidly that you can't keep up with new opportunities because of demand on the staff or the systems, consider contacting EDS. Whether it's increasing computing or communications capacity, assessing capabilities, or just providing insight, we can help a little or a lot.

CAN WE HELP ADD SPECIFIC BUSINESS KNOW-HOW?

Many companies can offer you experience in technology. We can offer you experience in your industry as well as in technology. No information technology company has as many people experienced in as many different industries as EDS.

Our people are committed to understanding your business so that we can help you accomplish your goals and take advantage of opportunities.

CAN WE HELP YOU MOVE FASTER, AND DO MORE?

Yes. For example, we can help you increase your speed to market by giving you access to systems that we already have. Or, we can work with you to help you use the capabilities you already have in place for more things. So you wind up with increased speed and more agility—key attributes in changing times.

CAN WE HELP YOU MAKE YOUR CASE?

Management is always concerned about information technology's effect on the bottom line. We can help you demonstrate information technology's contribution to directly improving flexibility, speed to market, even cost control.

CAN WE HELP A LITTLE OR A LOT?

Consulting is one way we help. We can also help develop systems. We can help integrate systems. We can provide partial or complete systems management. We can supply you with all the support *you* deem necessary.

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Regardless of task or time, we can help you turn a changing business environment into a competitive advantage for your company. To learn more, write EDS, 7171 Forest Lane, C7, Dallas, TX 75230. Or call (214) 490-2000, ext. 1407.

EDS

TAKE ADVANTAGE OF CHANGE℠

Telecom-related decisions should be considered as critical as decisions concerning available labor, raw materials and transportation.

companies are prepared to procure telecom services and equipment outside the United States on their own, and they strongly counsel companies to seek local representation in building those networks. Cory Van Wolvelaere, a partner in Andersen Consulting in Chicago, for example, said that trying to manage an overseas network project as though it were being done in the United States is a recipe for failure. The foreign technical and cultural perspective must be addressed, and the best way to do this is to involve local people who are attuned to the local regulations, involved with the PTTs and in the best position to advise on what types of equipment can be installed in the nations the network will serve.

Similarly, a KPMG Peat Marwick study advises international users to enlist the aid of local network professionals in negotiating with PTT officials, who are more open to dealing with people from their own country than with outsiders. The advice is sound, as one expert notes, because the regulatory situation in Europe seems to change every day.

Russ Romanelli, chairman and CEO of World Communications Inc., based in New York, suggests that "it's important that your U.S. international service carrier [ISC] be familiar with the European marketplace." (An ISC is a U.S. company licensed to carry traffic internationally and is responsible for establishing full end-to-end service by working with the PTT at the distant end.) "Ideally, your carrier will employ foreign nationals in the countries that you seek to target," Romanelli continued. "These should not be transplanted Americans whose tenure in the overseas post is temporary."

The CIO and his or her telecom network manager should feel comfortable viewing the carrier as their agent in dealing with the PTTs as well as equipment vendors and other service providers. A carrier's overseas contacts will assist the company with the establishment and operation of the network.

A second important resource is the overseas administration. The PTTs are well aware of the importance of American investment in their countries. Many have established marketing and technical offices in the United States to promote their services and the advantages their country provides. The participation of the PTT in a company's overseas network will be governed by the company's plans for that country, from providing simple telephone service to serving as the hub or focal point for its pan-European telecom and datacom network.

Swiss Telecom North America, which represents the Swiss PTT here, suggests that regardless of whether a company is planning to enter Europe for the first time or expanding its operations there, it is essential as a first step that a long-term plan be formulated that defines as clearly as possible what the supporting telecom network is expected to do, and establishes timetables that determine how and where it will grow. Telecom-related decisions are as critical as decisions concerning available labor, raw materials and transportation and should be made independently of those other decisions. Keep in mind that the purpose of the network, not the type of business, should govern the selection of an overseas telecom base.

Choosing where to site a telecom base is easier, because it does not involve heavy investment in personnel or real estate. The Swiss PTT and other administrations are making these investments as a means of attracting American firms to use their services.

Some U.S. carriers are working with the PTTs to expand their traditional private-line services to Europe by enhancing them with many of the features now taken for granted in domestic U.S. networks. These enhanced private networks provide, along with the private line, a mix of switched services including voice, packet switching and store-and-forward fax. U.S. carriers are also readying more advanced services such as dynamic bandwidth management, integrated voice/data networking, virtually instant network redundancy/rerouting and other options. These services, together with network management and facilities housing, come under the general heading of "one-stop-shopping," which is designed to make life easier for information and telecom professionals.

A third resource is the international telecommunications consultant, who should be able to offer a broader perspective than an individual PTT or U.S. carrier. But check credentials carefully and investigate references. Consider using the Society of Telecommunications Consultants in New York and editors of leading telecommunications trade journals as a source for recommendations.

Never have the opportunities to participate in a global market been so exciting, nor has the building of an international telecom network to support this participation been so challenging. MIS and telecom personnel grappling with designing an international network to support their company's ventures overseas are playing a game whose rules change almost daily. These managers should take advantage of the expertise of U.S. ISCs and representatives of the overseas carriers, as well as other professionals who understand requirements, who will work to develop a system that meets current and future needs—and who will be there to help during its ongoing operation.

Thomas Lamoureux is a senior representative of Swiss Telecom North America, which represents the Swiss PTT in the United States. George Frylinck is senior vice president of sales and marketing of World Communications Inc.

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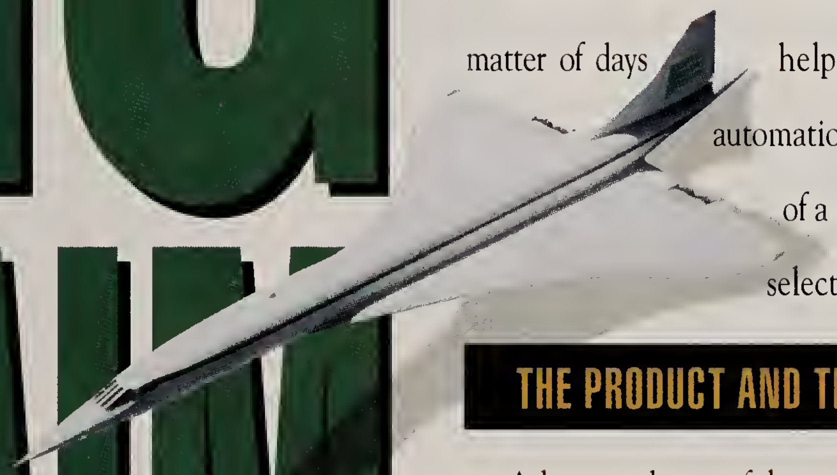

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WHAT DO USERS REALLY WANT?

Simple: They want information systems that meet their needs. But perhaps the only way for IS to find out what those needs are is to engage in new kinds of dialogue that help users elucidate the business process.

It is perhaps the oldest, most universal and most painful of all information technology problems: You ask users what they want in a system, they sign off on specifications, you build and deliver the system—and then these same users say they want something different. Any IS manager who hasn't been hit by the arrows of discontented users probably hasn't held any one job long enough to present a fair target.

How do you design a system that users really want? According to a range of CIOs and consultants, you can't. What you can do is help *users* design the system they want. "If you're telling your business users how to solve their problems, you're missing the boat," said Robert Borneman, a vice president with responsibility for IT at National Fuel Gas Distribution Corp. in Buffalo, N.Y.

There are no magic solutions. The concepts and techniques now being touted as the answer to this long-standing problem have themselves been floating around for years: They include cultivating business-savvy systems analysts, listening more carefully to users, employing joint application design techniques and prototyping. But what once was a lot of talk is now being put to heavy-duty use at a growing number of companies, and the results are finally transforming the way information systems—and even business processes themselves—are conceived, designed and implemented.

According to Newton, Mass., management consultant Ralph Loftin, IT managers have to redefine their role to succeed in getting at users' needs. Traditionally, said

BY DAVID FREEDMAN

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Loftin, IS has approached users in the role of either an "expert" or a "problem-solver"; while these can appear to be effective approaches to the problem, they actually doom many projects. "Experts and problem-solvers only get into solution definition," explained Loftin. "What you need to do is become involved in problem definition. That means establishing a relationship with users that allows getting behind what the client says is the problem [in order] to get at the real problem."

That real problem, said Loftin, is typically very different from the one perceived by the user. And Loftin should know. When he was the CIO of Blue Cross/Blue Shield of Massachusetts in the early 1980s, he managed to completely misdiagnose a problem in his own 750-person department. "We felt our managers weren't doing a good job at performance appraisals," he recounted, "so I brought in a consultant to provide training for our managers on goal-setting. Fortunately the consultant realized that our problem wasn't with performance appraisals but was actually a deeper morale problem due to [inadequate] decision-making processes and [a flawed] organizational structure. If I had had the misfortune of bringing in a consultant who only provided training, I would have solved the performance appraisal problem but not the morale problem. IT managers have to do the same kind of thing for their clients."

The roots of an unwanted system begin with the systems analysts asking the wrong question of business managers.

The IT organization at the Minneapolis-based Grand Metropolitan Food Sector, which includes Pillsbury, found it could uncover the appropriate user problems by changing the process of developing system requirements. "We looked at our old method of having systems analysts interview users one-on-one, and we decided we had to have a better way of doing it," said Carl Wilson, senior vice president of management information services for the food sector. "It's not so much that we were having failures, but we knew we could do better." In particular, Wilson wanted to ensure the success of a number of highly strategic systems that were scheduled for development, including an order-processing system and a foods-standards system that would be overseeing the mix of ingredients

Knowing What to Ask

Information executives in search of answers haven't got a prayer unless they're armed with the right questions

One of information technology's most outspoken proponents of the need to do a better job of pinning down users' needs is James C. Wetherbe, director of the MIS research center and professor of MIS at the Carlson School of Management of the University of Minnesota. Wetherbe noted with horror the results of a recent study carried out by his school, which found that every single one of the 76 systems examined required revisions to even *approximate* management's requirements. "Given an appropriate design, most information systems departments can implement a system right," he said. "The big problem is correctly determining information requirements and designing the right system."

Wetherbe noted that several methodologies for getting at user requirements have long been available, including Business Systems Planning, Critical Success Factors and Ends/Means Analysis. It doesn't matter which method is used, he claimed: The important thing is that instead of directly asking users what sort of system they want, the questions should help them start with high-level business considerations and then "back into" an expression of their information requirements. For example, here are the key questions that an IT manager utilizing the Business Systems Planning methodology should pose, along with the answers at which an order-processing manager might ultimately arrive:

Q: What are the major problems encountered in accomplishing the purposes of the organizational unit you manage?
A: Being out of stock too often and allocating limited inventory to the wrong customer.

Q: What are good solutions to these problems?
A: Better inventory management and letting the warehouse know the importance of customers and of specific orders.

Q: How can information play a role in any of these solutions?
A: Systems could provide out-of-stock and below-minimum reporting, automatic reordering and electronic access to customer and order importance.

—D. Freedman

that went into each of its products.

As a result Grand Met/Pillsbury came up with a new way for IT people to interact with users. According to Wilson, the roots of an unwanted system begin with the systems analysts asking the wrong question of business managers (see related story, Page 26). "If the first question is 'What do you need?' " he said, "they're going to tell you what they think they need, except they'll be wrong. The proper question to ask is 'What decisions do you need to make?' " Wilson explained. "Then you get them to explore their decision-making process, and once you can come to agreement on that, you can start to determine the sort of information they need to make that decision."

At Grand Met/Pillsbury the decision-making process is explored in a formal joint application design, or JAD, session, during which systems analysts and business users and managers sit down to share their thinking. The payoff of these sessions can go far beyond designing a good information system, Wilson claimed. "We've probably held 60 of these sessions in the last year alone, and there hasn't been a single session in which we haven't been able to make improvements to the business process before we even talked about automating anything."

Eventually, of course, the system issues do get addressed, but not in the interview style traditionally employed by systems analysts. "If the people on the systems side are active listeners," said Wilson, "then the users will give you their requirements without even realizing it in the course of discussing their problems." After seeing the results of two years' worth of JAD sessions, Wilson has made them a requirement for all new systems development efforts.

> *"We've probably held 60 JAD sessions in the last year alone, and there hasn't been a single session in which we haven't been able to make improvements to the business process before we even talked about automating anything."*
>
> *–Carl Wilson*

National Fuel's Borneman is another confirmed believer in JAD-type approaches; he noted that the cross-functional nature of many major systems these days makes it absolutely essential to bring users from the different areas affected into the same room. "The group dynamics establish tremendous synergy between participants," he said. "Everyone learns from everyone else, gains an appreciation of the other's job, and finds out who has which information that someone else needs. Any individual who thinks he knows everything about a problem is crazy. That's why we have organizations."

National Fuel has already employed its JAD-based approach to develop a customer-interaction system that affects every aspect of the business, including ordering, billing and customer service. Now Borneman plans to go even further. "We want to develop an entirely new information strategy and architecture," he said. "The last time we did this, in 1978, we spent two and a half months doing serial interviews of functional managers. This time we got 35 key managers together for four days and did a group interview to discuss the major business processes and determine which managers are affected by which processes. Then we held 17 separate sessions to determine the information needs of each process, with each session including anywhere from seven to 35 people." The results: All conflicts about the planned architecture were resolved on the spot, which Borneman feels will ultimately save the company a fortune in system redesigns.

According to Pete Kitch, a systems analysis consultant in Wichita, Kan., IT managers should take advantage of the JAD approach to encourage users to consider not just how information systems can help them perform their existing functions, but whether or not information systems can result in entirely new functions. "If you haven't changed the pattern of work when you design a system," he said, "then you haven't done your job."

Kitch worked with Philadelphia-based office-products manufacturer Avery International to help the company automate various activities in its Soabar division, which produces labels and name tags. "The steps for preparing an order for manufacturing were all sequential," he explained. "First the order would be processed, then it would be engineered, then it would be priced, then sent to the factory floor for retooling, and then materials would be assembled." After pulling the managers together to examine the various processes, Kitch helped the company come up with a system that allowed the performance of engineering, retooling and materials assembly in parallel.

While agreeing that JAD-type approaches can result in systems that even exceed users' initial expectations, CIO and Director of Information Systems V. James Onalfo of Kraft General Foods International in White Plains, N.Y., warned that there are potential pitfalls to the process. All the JAD sessions in the world won't result in a well-received system if the right users don't participate or if senior management hasn't made the system a high priority, he noted. "The CIO has to be like the conductor of an orchestra identifying which instruments play which tunes and with what variations," he said. "He has to make sure his staff has pulled together the right team of business and systems analysis skill sets to develop the requirements, and every project requires a different set of players because every problem is different. And if senior management isn't excited about it, it just isn't the right time to try to solve the problem at all."

In addition, said Onalfo, intimate user involvement in the project must continue beyond requirement definition into system design. His company brings prototyping tools right into the JAD sessions to kick off the design process. "You've got to do something to keep users from feeling like they're waiting forever to see something tangible," said Onalfo. "I like prototyping not just because it improves the design, but because it gives the users the mind-set that they're part of the process. Prototyping is a way of telling clients that we in IT don't know what they need, and it prevents them from expecting something that's right the first time."

> *"IT people should be held accountable for whether or not the system reduces waste, speeds order-cycle times or fills more orders. Businesspeople should be responsible for helping to develop the system design, reviewing documentation and implementing the system."*
>
> *–Bart Perkins*

The idea of having users drive the requirements and design process is catching on in Europe, too. Peter Ligezinski, EDP manager for Vienna-based Investment & Trust Bank, has instituted a user-oriented development process that eschews conventional JAD sessions and prototyping. Ligezinski arms a group of programmers with software "templates"—pre-coded, generic programs that provide most of the functionality of a typical application—and then has each of the programmers sit down at a workstation with a key user and customize the template to fit a particular component of the system. For the investment-portfolio management system he is currently developing, for example, one programmer is working on the part that will handle balance sheets; another deals with order processing and yet another with trade execution.

To make sure each template can handle not only the current business requirements but most future requirements as well, Ligezinski works with users to identify "software destabilizing factors"—that is, elements of the business that are likely to change and make the system obsolete. "We talk about the kinds of things that have happened in the business in recent years," he explained, "and then I try to formalize these changes in a file that will allow the introduction of new types of business." In his current project, he is adding a template that will allow certain customers to trade temporarily at nonstandard commissions, even though the bank has never offered that service. This sort of anticipative flexibility, he claimed, results in what he calls "zero-maintenance systems"—not to mention satisfied users.

Whatever techniques are employed, said Bart Perkins, former director of strategic planning for the Boston-based consultancy DMR Group Inc., they will ultimately fail if the IT organization doesn't act relentlessly to ensure that user satisfaction remains high throughout the design process and long after. "I call it the Chinese Water Torture approach," he said. "You've got to keep asking yourself how you can be a little bit better and keep the pressure on yourself to improve the system over time. That involves more than just building a good system. You have to consider training, organizational questions and the way you present things."

One of Perkins's recommendations for keeping both users and IT staff continually focused on improvement is to create a reward system that ties users' bonuses to the system's success and IT staff's bonuses to the success of the business components that the system is addressing. "IT people should be held accountable for whether or not the system reduces waste, speeds order-cycle times or fills more orders," he said. "And businesspeople should be responsible for helping to develop the system design, reviewing documentation and implementing the system."

In the end, said Bill Gillette, director of information systems for gas utility KN Energy in Denver, a certain amount of user dissatisfaction is probably inevitable—especially if the system is a ground-breaking, strategic effort. "The bigger the quantum leap you're taking," he said, "the less you can expect to have a system that everyone loves 100 percent. Hopefully there won't be a huge gap between expectation and reality, but you have to plan a post-implementation follow-up for all your projects. I haven't seen the perfect system yet." Clearly, though, many IT organizations are getting a lot closer.

Dave Freedman is a freelance writer based in Brookline, Mass.

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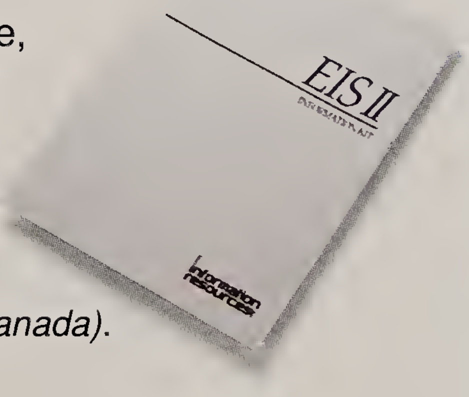

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THE LAY OF THE LAN

Few organizations have the luxury of inventing their LANs and their LAN-management schemes simultaneously. So real-world solutions require improvised patchworks of commercial tools and homegrown ingenuity.

BY LESLIE GOFF

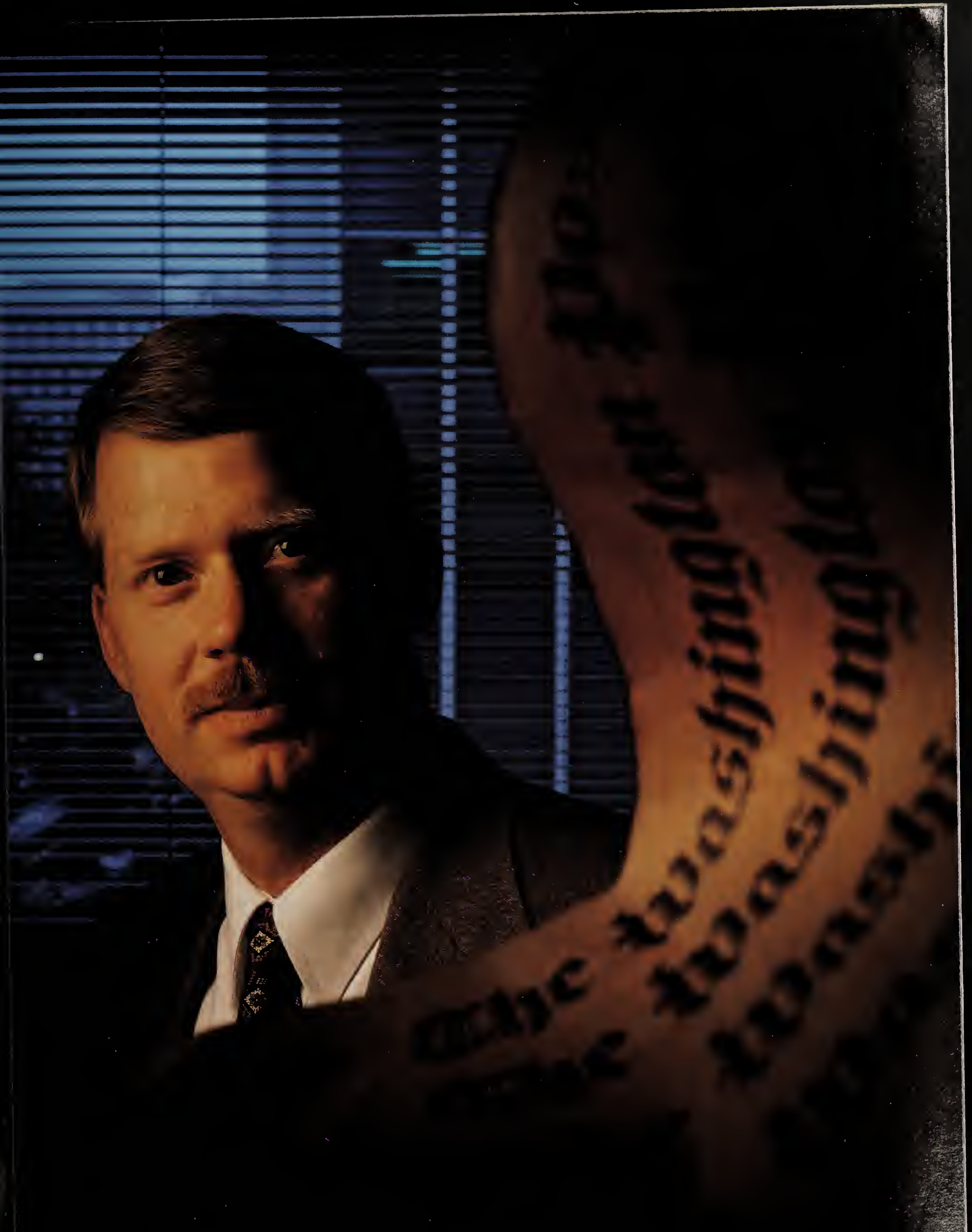
PHOTO LEFT BY RUSSELL INGRAM; PHOTO RIGHT BY KATHERINE LAMBERT

GARY DINGBOOM *(right) works out network snags through trial-and-error.* **KEITH ENSTROM** *(above) is waiting for the industry to produce a comprehensive management package.*

IN THE VOID BETWEEN THE PROMISE OF STANDARD NETWORK manage-schemes like SNMP and CMIP and the reality of today's internetworks of multivendor LANs lies the challenge of providing distributed computing: how to manage an environment more complex than that of a mainframe, but with few of the controls of the mainframe world. A look at the network management strategies of six companies, each at a different stage of network development, highlights the progressive difficulty of putting together the tools, the processes and the people to manage such an environment.

For a handful of companies, network management is a driver of the network from day one. At Brigham and Women's Hospital, in Boston, the technology mix on the three connected networks is kept to a minimum to simplify management, and a hospital-specific network operating system with a full array of monitoring and measurement tools is being put in place (see related story, Page 34). GE Nuclear Energy, in San Jose, Calif., which is in the middle stages of implementing a corporatewide network, outlined its network management requirements in its original RFPs from system integrators. Bids that did not deliver network management solutions were not considered (see related story, Page 38).

More often than not, however, network management strategies evolve along with the network itself. The Washington Post Co., for instance, is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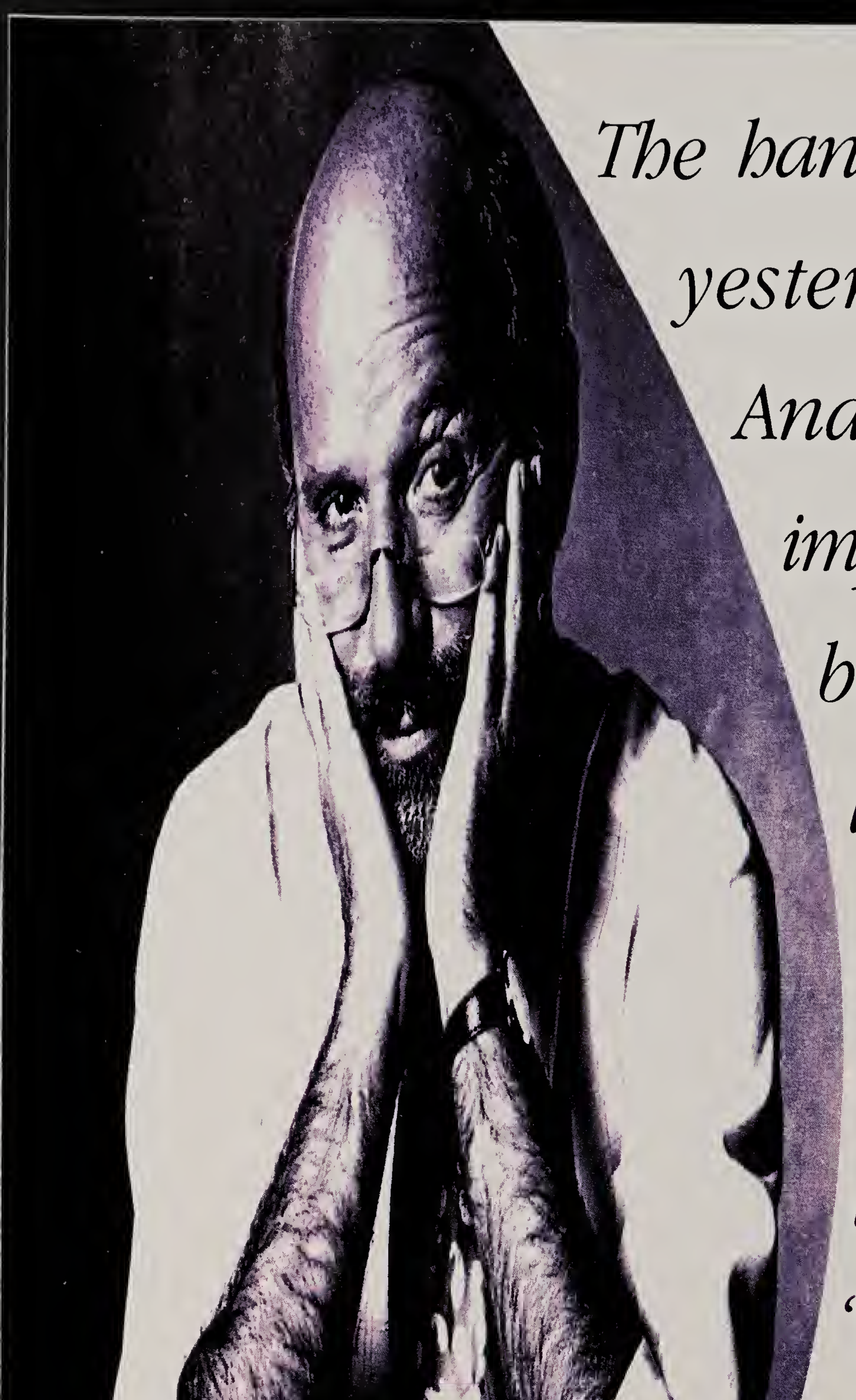

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just starting to confront the task of integrating its local area networks and is managing by trial and error. John Deere Dubuque Works is struggling with an "install now, manage later" legacy inherited from the company's engineers, who designed their own LANs and ultimately implemented critical applications on them. Now there are six engineering LANs connected with a factory floor LAN and several subnetworks, but the company still lacks formal management procedures.

> *"We have 10 times the processing capability on the desktop as we do in our data centers, but we don't have the capability to unleash that."*
>
> *–David B. Lively*

United Parcel Service, on the other hand, has a five-layer support structure in place to troubleshoot and manage LANs. The layers roughly parallel the layers of the network. The opposite situation exists at GTE Corp., which is working to merge and pare down its decentralized support organizations.

Underlying the strategies of all six companies is the desire to exploit the latent processing power in their networks.

"We have 10 times the processing capability on the desktop as we do in our data centers, but we don't have the capability to unleash that," said David B. Lively, senior advisory systems engineer in the Field Services Department of GTE Corp.'s Telephone Operations in Westfield, Ind. "One of the reasons is that we need to manage [the networks] as one environment."

Gary Dingboom, information systems manager at the Washington Post Co., the parent company of the newspaper, is responsible for one LAN, a two-year-old, 45-user Novell network that spans two buildings at company headquarters and runs off-the-shelf office automation software. Three other LANs—one in accounting, one in the editorial offices and one in the advertising offices—are managed separately.

Plans call for all of the networks to link up eventually, but Dingboom hit snags in the first attempt to connect his network to the accounting depart-

Mission-Critical Condition

At one Boston hospital, a dose of vendor homogeneity helps preserve network vital signs

Networks are hailed for liberating users from a single vendor's clutches, but multivendor is not always better. In some environments, where the idea of running "critical" applications across the network takes on a whole new meaning, less is more.

"We have to have a pretty good reason for mixing equipment, and when we do, we really have to test it," said John Glaser, vice president of information systems at Brigham and Women's Hospital, in Boston. "If we screw up, it can kill people."

So Brigham and Women's relies heavily on its three interconnected networks, including a Data General minicomputer-based medical network dubbed MIIS (Meditech Interpretive Information System). While information sharing across departments is a relatively new practice at many companies, hospitals have always worked laterally, Glaser noted. Information collected from myriad sections makes "one composite picture of a patient."

"Someone goes to a terminal to look up results every 15 seconds," Glaser added. "So we can't, say, shut down the chemistry lab [to troubleshoot a network problem]. We're so dependent on systems that our manual processes [have become] pretty antiquated."

The maximum downtime Brigham and Women's can tolerate is two hours, making Glaser's network-management priorities stability, quick problem detection and resolution, and the ability to make network changes without risk. The MIIS network, which supports 24 logical clusters of 82 internally developed patient-care and administrative applications, has been stable, Glaser said, but lacks state-of-the-art management features. Consequently, he recently began converting the MIIS network to a PC-based token-ring network running under MUMPS, the de facto standard medical software language. "MIIS tools aren't very good for looking at the network," he said. "MUMPS tools are very good. From a single terminal, you can look at the whole network and find problems without hearing from users."

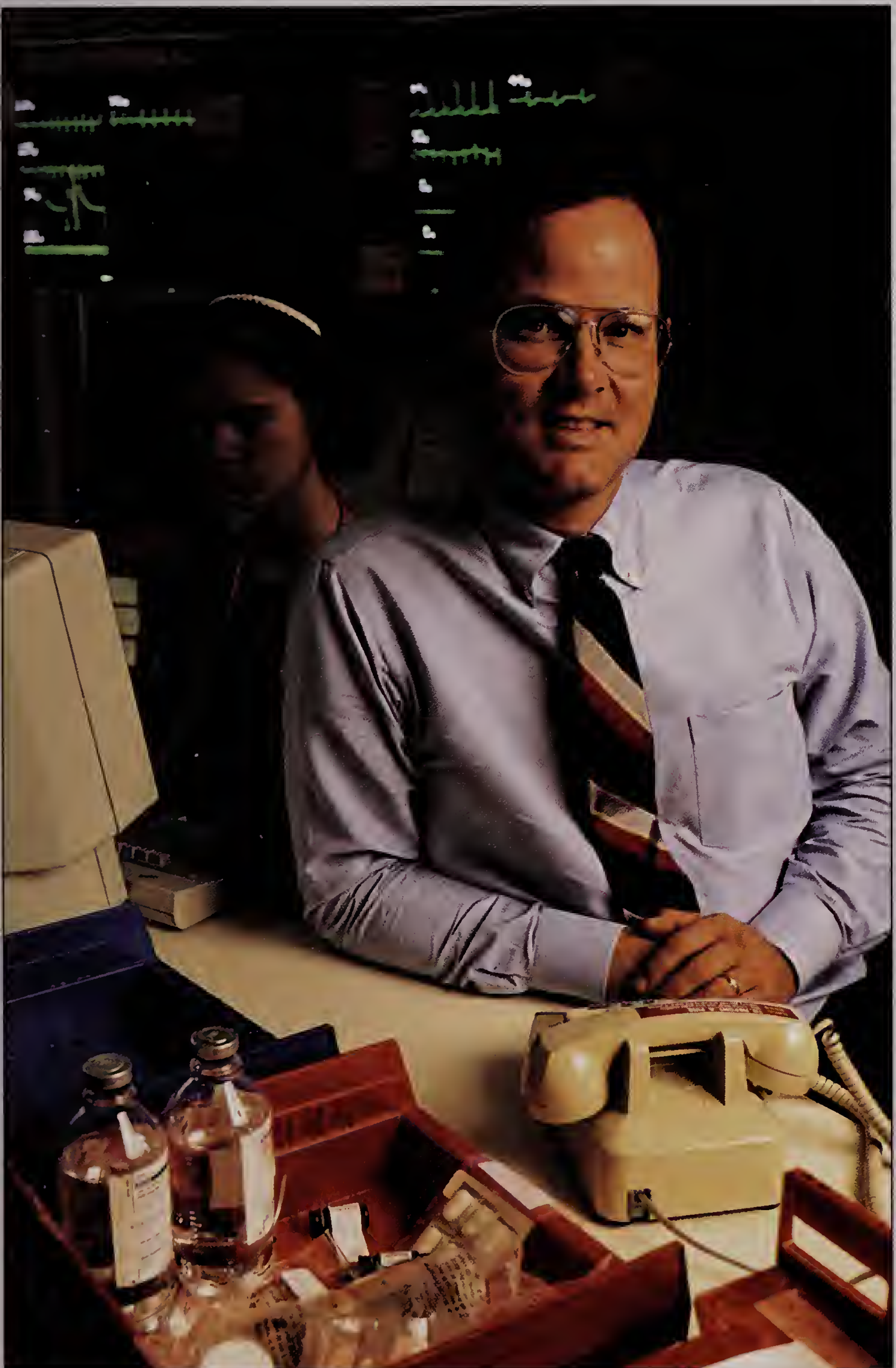
The MUMPS network architecture will be as streamlined as the MIIS network: Users will have diskless 386-based workstations connected to 486-based servers on a 4MB token ring. The servers (there will be 100 altogether) will be connected via a 16MB token ring.

"Our really critical applications will be on this network," Glaser said. "It will be very homogeneous, and we'll just need the MUMPS network operating system to oversee all that." *—L. Goff* ment's LAN, which also runs under Novell's NetWare.

"We want to test whether we can bridge to other LANs, and I get to be the guinea pig," he said. "Linking with the [accounting] department was supposed to be a simple thing to do, but we found out that we have some drivers that are not all under the same NetWare version as their drivers. The networks were only 'brochure-compatible.' "

Dingboom is having the drivers on his network updated and will try a second time to link the two LANs. While the problem is relatively easy to solve, it underscores the frustrations of network management. "As the network begins to grow," Dingboom said, "how can you manage all these different aspects of it?

"We just have to sort that kind of stuff out," he added. "Luckily, ours is not a critical production network. I wouldn't want to be betting the farm on performance and using this trial-and-error method if I had to keep the network alive."



JOHN GLASER: *"If we screw up, it can kill people."*

PHOTO BY WEBB CHAPPELL

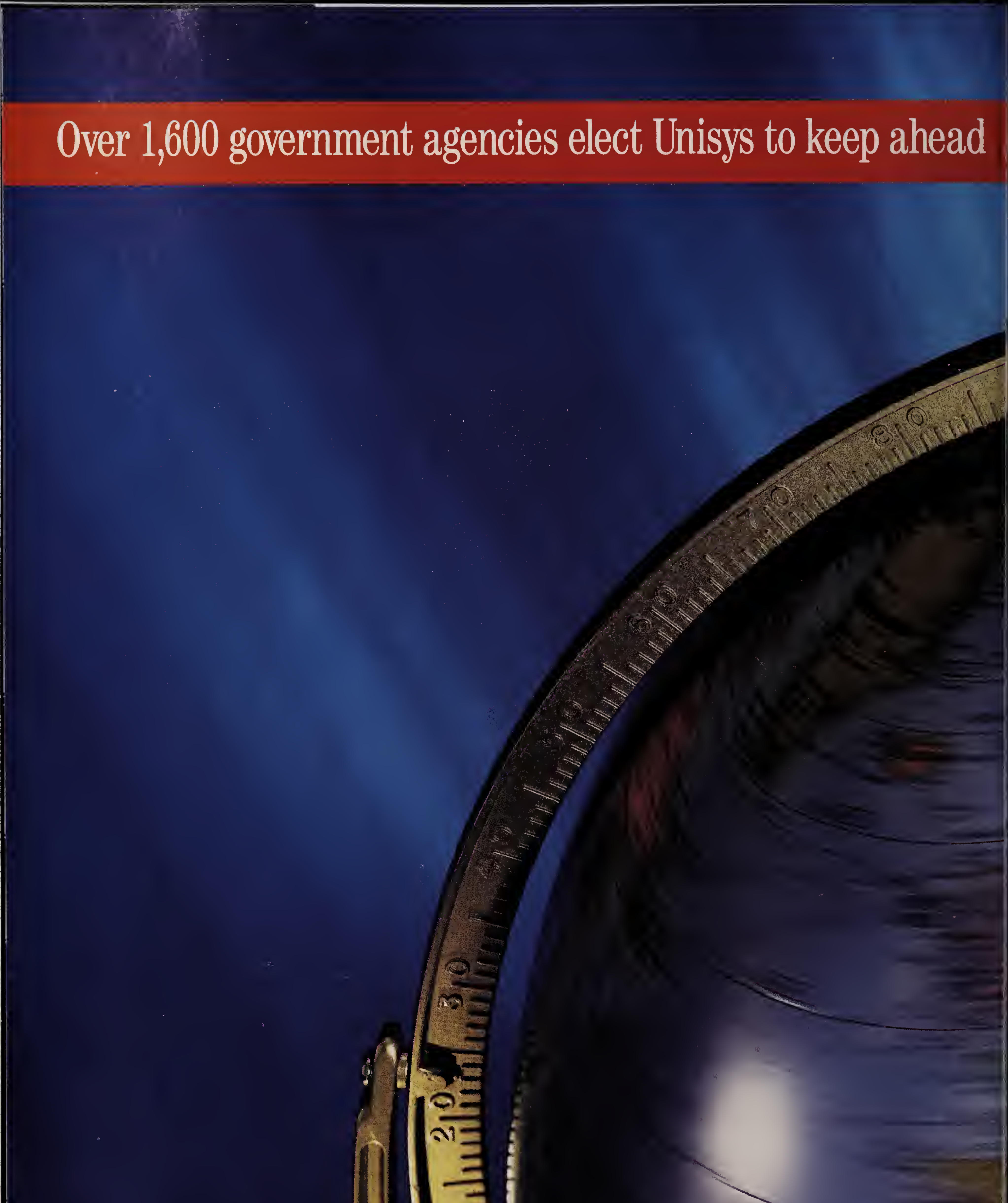
At John Deere Dubuque Works, a construction equipment manufacturing division of John Deere & Co., the network *is* the farm. The six local area networks developed by the company's engineers for productivity applications and information sharing have been connected to a broadband backbone to enable communication with the factory-floor networks.

"Now we have this whole new business function that the organization never had to address before," said Keith Enstrom, manager of manufacturing systems. "The network is becoming a way of life, and we need formal procedures for developing and maintaining it."

Specifically, Enstrom is concerned with troubleshooting, security issues and fault isolation and resolution. He said he has approached these issues on an ad hoc basis but is waiting for the industry to produce a comprehensive management package.

"We're looking for something like SNMP [Simple Network Management Protocol] that will span networks and applications," he said. "It's no longer enough to say the computer is down, because there may be five computers and four networks, and the problem is somewhere within that."

In the meantime, the Dubuque Works is using such off-the-shelf packages as Network General's Sniffer Network Analyzers and Hewlett-Packard Co.'s LAN Analyzers for routine troubleshooting, diagnostics and network traffic analysis. The company also has embedded some internally developed routines and utilities in its applications that enable network managers to "say hello to all the devices on the network. If they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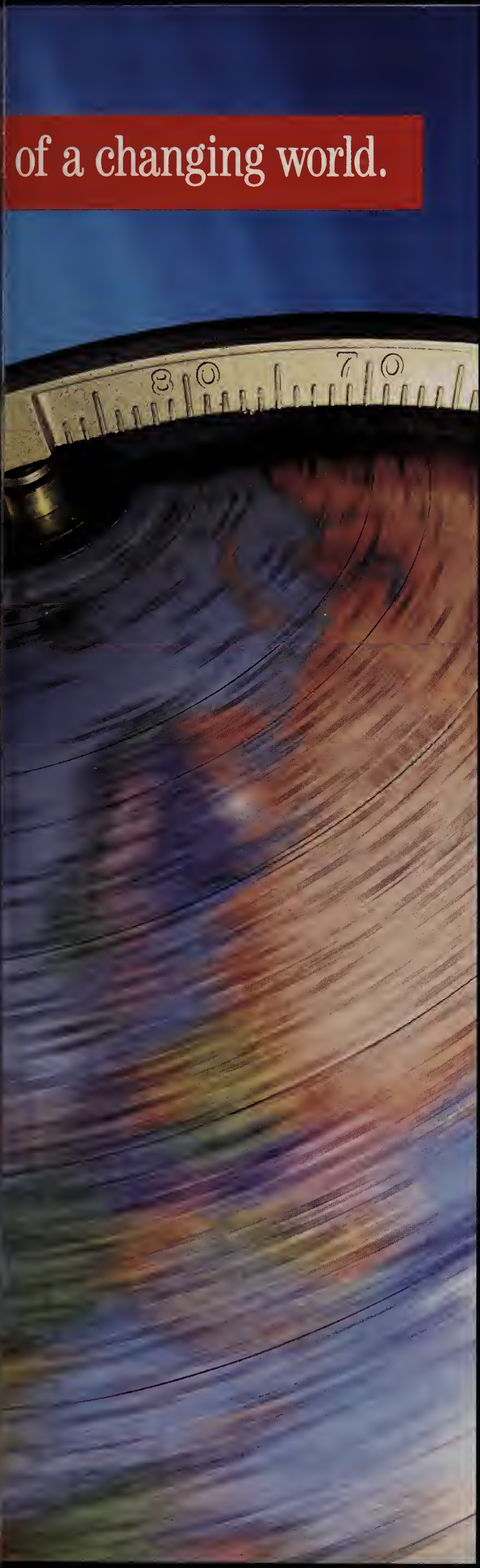

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UNISYS

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MARC DODGE: *"There is no one in a glass house looking at the entire network."*

PHOTO BY KENT HANSON

respond, everything is OK. If they don't, we know there's a problem there," Enstrom said. "We use this to determine what parts of the network are up and what parts are not."

Ideally, Enstrom would like to see an expanded version of this ability built into all distributed applications. If a screen went down or a keyboard locked, the application would communicate to the user what had happened and whether to call for assistance. Moreover, "if applications were intelligent enough, they would also alert the network operations people so they could start working on the problem," Enstrom said.

Networks spread across a far-flung area present yet another management quandary: Who in the organization is responsible for correcting network outages? If every product on the network were SNMP-compliant, it would be fairly simple to designate a central support staff that would monitor and control the internetwork from one location. But when hardware, applications, operating systems and the network devices and wiring require a variety of different management systems, the lines of responsibility begin to blur.

"If you're going to downsize, it won't work unless you give [end users] the ability and power to deal with their own network problems," said Marc Dodge, manager of the LAN and PC Systems Group at UPS, in Paramus, N.J. "We've seen that users can do a lot of this work and want to. If the Dallas office has a problem with a server, they would rather handle it themselves."

Nipping It in the Bid

Solving network-management problems could be easiest when the solutions begin at square one—the network RFP

Companies that have not yet implemented wide-scale networks have the luxury of making network management requirements the driving force of LAN design and implementation. Sush Patel, enterprise network project manager for General Electric's Nuclear Energy division, is taking advantage of that luxury.

When Patel solicited bids for his company's network, which will span corporate, sales, service and manufacturing offices in six states, he made compliance with the Simple Network Management Protocol (SNMP) a requirement. Moreover, the RFP called for a single interface for looking down into all the pieces of a multivendor network and for a full suite of management tools for configuration, fault analysis, performance measurement, accounting and security.

"The driver is the network rather than the devices on the network," Patel said. "And network management is a driver. Our decisions to buy pieces for the network will be based on how well they comply with our network management specifications."

Patel does not have the luxury of starting completely from scratch, however. Basic connectivity is already in place, and the remote sites sport a variety of network operating systems and hardware. "So it's important to be able to manage the network taking into account the diversity in protocols and network operating systems and hardware platforms," he said. "We take a dim view of proprietary net management packages because they may limit growth and flexibility."

Patel said he plans to use SNMP and later migrate to the OSI-based Common Management Information Protocol (CMIP). Both are protocol suites that enable users to manage the heterogeneous bridges, routers, concentrators, servers and other devices on the network from a single control panel. Neither is fully mature, and CMIP is projected to be more feature-rich than SNMP in the long run.

For now, however, "SNMP management systems are the most promising technology for managing all of the devices on the LAN," noted Jim Harrison, program director of the Global Networking Strategies Service at the META Group, a Westport, Conn.-based consulting firm. "We wanted to do this three years ago, but the industry wasn't mature enough; there were not enough standards," Patel said. "Now more and more vendors are providing SNMP capability on their products, so it is increasingly easier to have a common management scheme."

—L. Goff

UPS has 475 LANs in 200 locations networked into a T-1 backbone. The majority are token ring LANs running the NetWare operating system. There are 8,000 PCs on the LANs.

Responsibility for network management is layered throughout the company. When problems occur, users advance through the various management levels until there is a diagnosis and resolution. "There is no one in a glass house looking at the entire network," Dodge said, "and in a large network, there isn't going to be."

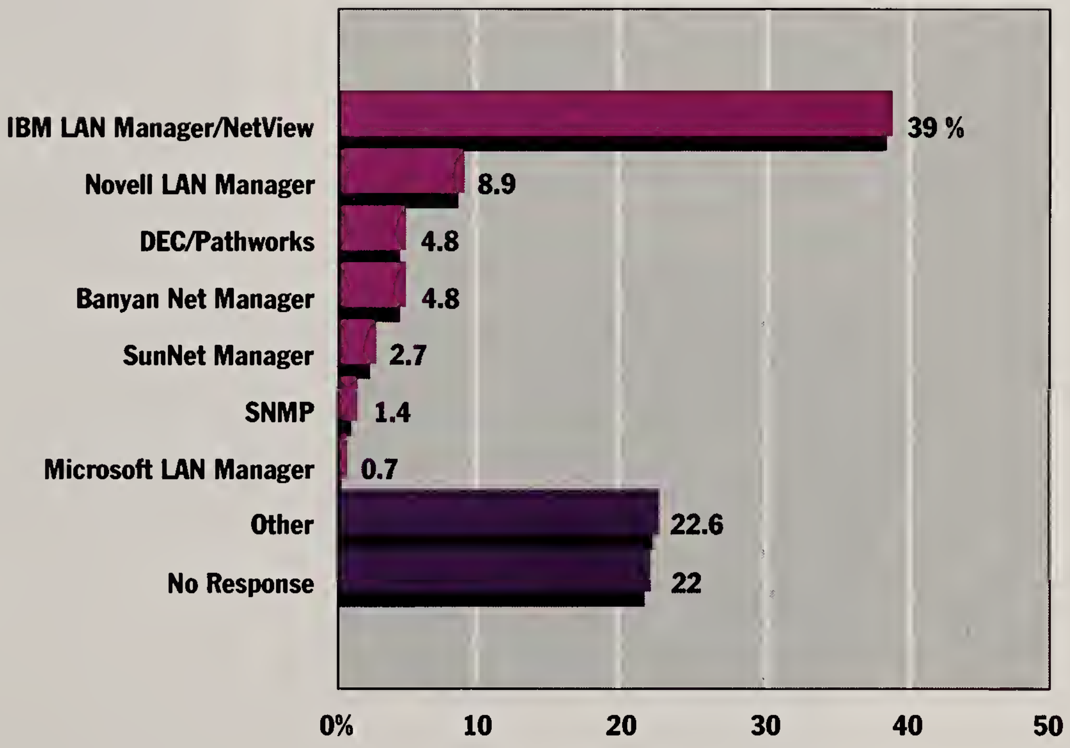
Site administrators at GTE wrote network management utilities and software, which has been gathered into a national clearinghouse and is available to users on request.

GTE, however, is attempting to organize a central network support group that will standardize the company's disparate LAN environments and will design its own toolkits for all aspects of network management. Lively heads a new task force dubbed SPEAR (Services Productivity Enhancement and Review) that is evaluating how best to unite the functions of GTE's two network services groups and corral the myriad locally developed network tools scattered around the company.

GTE began to implement LANs in 1985, when its business units were autonomous. Development and implementation took place at the local level. Lively's Field Services group grew out of this move toward user self-sufficiency. A separate Data Services group was responsible for managing the wide area networks between the local sites and the national data centers. "Now we're trying to marry the net management capabilities to manage the whole thing as one environment, rather than two," Lively said.

Managers of Choice

Four hundred Fortune 1000 companies were asked to identify the PC LAN management packages they use. Respondents were allowed to mention more than one product.



SOURCE: BUSINESS RESEARCH GROUP

"The magnitude of blending the two organizations is so great it will have to stretch out over time," he added. "I envision a migration of functions and people into a single network-management organization. Individuals will have to be cross-trained in general technologies and become specialists in specific pieces of technology."

SPEAR also was chartered to find tools for managing the LANs and to choose those that should be standardized. When LANs originally began to spring up at GTE, Field Services had site administrators who wrote utilities and software to manage them locally. All of that software has been gathered into a national clearinghouse and is available to users on request. "Typically, there is little documentation, so it is kind of a buyer-beware situation," Lively said.

A second source of internally built software is being customized for use at all locations. These are primarily network monitoring tools such as error pagers, which alert network managers to trouble. Third-party network analyzers and monitoring tools are also in use.

Lively hopes to develop a definition for a comprehensive toolkit that would address each aspect of network management. Existing tools would then be plugged into that framework, and where there are holes, the company will either buy off-the-shelf software or develop its own.

"Our desire would be not to write any tools, but to buy them all," Lively said. "But they don't exist."

Leslie Goff is a freelance writer based in New York.

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A VIRTUAL COMPANY

VeriFone's information systems don't merely reflect the company's distributed structure; they virtually defined it

BY DAVID FREEDMAN

If you're having trouble applying distributed information technology to your business in an effective way, maybe you've got the whole process backward. What you really need to do is first put the information systems into place, and then distribute your company around them.

It may sound a little off-the-wall, but that's what VeriFone Inc. has done, and the results suggest the approach has something going for it. Ten years ago VeriFone consisted of a few people with PCs who set up a network to help merchants avoid bad checks. Now the company takes in over $150 million a year, having gradually stolen 65 percent of the red-hot market for automated transaction processing away from such small-time competitors as IBM and GTE. Nominally headquartered in Redwood City, Calif., VeriFone has 1,200 employees in 30 offices scattered around the world.

According to president and CEO Hatim Tyabji, distributed IT has played more than a small role in the company's success. "The kind of performance we've had is tied to our culture," he said, "and that culture is based on the information systems that underlie it. While other CEOs say that information technology helps run their companies, I go seven steps further and say our information systems *are* the company."

VeriFone makes the little boxes through which salesclerks swipe your credit card to phone a host computer to check for credit approval. The company also provides the local, network and host-based software behind the process, typically custom-designing applications for a customer. Besides dominating the point-of-sale applications common in retail stores, VeriFone is aggressively moving into the nascent but rapidly growing market for point-of-service credit-card and credit-card-like transactions in fast-food restaurants (so you can put that Big Mac on your Platinum Card), supermarkets, health care providers and government benefit programs such as food stamps. "Nothing we produce, without exception, operates on a stand-alone basis," Tyabji said. "And thanks to our information systems, neither do we."

VeriFone's emphasis on IT dates back to its origin in 1981. Founder and chairman William Melton saw in his tiny new company an opportunity to apply his philosophy about distributing organizational resources to be near customers while speeding up the internal flow of information (see related story, Page 46). The company set up electronic mail and then its first information systems to allow employees on the road and in outlying offices to stay plugged in. A corporate culture soon emerged in which everyone demanded—and usually got—immediate access to all relevant information, and to each other.

Presiding over the development of the formal IT infrastructure that nourishes this culture is William Pape, VeriFone's fifth employee and, since 1988, the CIO by title. Pape felt a resonance with Melton's vision of a scattered, tightly wired company, and set to work building the systems that would make it possible. To avoid the agony of having to integrate a hodgepodge of technologies, Pape standardized on Digital Equipment Corp. VAXes, constructing a network that distributes computing power and data around the world in a way that is transparent to users. The result, according to Pape, is a "virtual company" in which employees stay physically close to customers and electronically close to one another.

PHOTOGRAPH BY DAVID POWERS

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Survival of the IT-est

VeriFone's founder says his company has prospered because it spreads employees out while keeping them wired together

WILLIAM MELTON: *"Real intelligence is in the frontiers."*

"My primary interest in business has always been the social organization," said William Melton, explaining why he started VeriFone Inc. 10 years ago. "The social organization would take on the characteristics of a biological organism and try to maintain itself. I believed that a Darwinian paradigm applied, that the organization that would survive . . . would be the one that was most efficient."

If VeriFone was an experiment in business sociology, it was a successful one. The company has grown from nothing to $150 million in these 10 years, overtaking its competitors in automated transaction processing and then leaving them in the dust. Melton, now 48, is still chairman, but he only spends about a tenth of his time helping to run VeriFone. "If you're not careful," he said, "the thing you create becomes your master."

Melton was a psychology and Chinese philosophy major who spent most of the 1960s roaming around Asia. When he ended up in Hawaii, he started a company that produced software for real estate applications. "We were totally unsuccessful," he said. "I spent 10 years learning how not to do business." He took the lessons to heart. After selling that company for $3 million, he plowed the money into a new venture he called VeriFone, using computers to provide retail stores with information on writers of bad checks. A few years later he moved into the larger market for credit card purchase automation.

Melton had two basic ideas for making VeriFone a successful, "intelligent" organism. The first was to send himself and his people out to where the action was. "Real intelligence—the information you need to understand and solve business problems—is in the frontiers," he said. "It's with the customers, on the manufacturing floors, with the component vendors. It's not sitting back at a headquarters office." His second idea came from his experience in writing programs. "Programs run better when you have tight, fast loops," he explained. "I was sure a company would run better if its information feedback loops were short and tight."

Unfortunately, his ideas seemed to conflict. How do you keep information flowing at high speeds among employees who are hardly ever in the same time zone, never mind building? The answer seemed obvious to Melton: Wire everybody up electronically. "A lot of people in the company didn't have a desk," he said. "But I made sure everyone had a PC." Electronic mail quickly became the main medium of communication.

By 1984 VeriFone had taken off, enjoying a growth rate—better than 60 percent a year—that Melton had always said would be the mark of a successful business organism. Today VeriFone looks like a model for a 21st century company. "When people heard about my ideas back in 1980, they thought I was smoking grass," Melton said. "Now I'm beginning to see the same ideas turn up in the *Harvard Business Review.*" *–D. Freedman*

"Any of us here are capable of extending our presence beyond the walls," he explained. "We've made VeriFone a distance-insensitive company held together by electronic glue."

One of the cornerstones of VeriFone's IT-driven culture is an electronic mail system accessed on a daily, if not hourly or even minute-to-minute, basis by every employee in the company, each of whom has a PC or terminal. About 35 percent of the company is actively online at any given moment; managers receive an average of about 60 messages a day and sometimes get a few hundred. "People log on religiously here," said Pape. "If you don't, you die."

The payoff has been stupendous, say VeriFone managers. For one thing, noted Tyabji, the system has enabled the company to ban the use of secretaries, leading to far more direct, timely and open communication among employees at all levels. "A lot of executives pay lip service to the idea of an open-door policy," he said. "But they still have a secretary guarding the door and screening mail and calls. Anyone in the company can reach me anytime through electronic mail, and they know I'll read that message. I get the immediate, unvarnished truth about what's going on in people's minds, and few CEOs can make that claim."

Tyabji is so adamant about the need for every employee to stay in constant touch via E-mail that he refused to approve the opening of a software development office in Bangalore, India, where telecommunications lines are an iffy proposition, until the office obtained a dedicated link. Tyabji announced the official opening of the office via a company-wide E-mail message—which he typed in himself in Bangalore. An E-mail connection is particularly significant for the one out of three VeriFone employees who spend most of their time on the road, traveling with laptops and logging in at airports, hotels and between meetings.

Can all this E-mail lead to information overload? Tyabji, who himself often gets more than 100 messages a day, dismisses the notion. "I've been hearing people outside the company talking about information overload for

PHOTOGRAPH BY MANUELLO PAGANELLI

years," he said. "I do get a certain amount of junk mail, but I can skim through it in minutes and delete it all with the press of a button."

VeriFone has structured its approach to getting things done around the ability to swap information and documents across vast distances. Most companies consider dealing with time-zone differences a hassle. VeriFone has turned it into a competitive advantage. Because its development and sales teams are scattered throughout the world, the company has found it can speed the progress of critical projects by passing them from time zone to time zone, resulting in an around-the-clock effort on which the sun literally never sets.

"Someone in Washington can work on a document all day and then put it into the system, where it will be pulled down by someone in Hawaii who's just starting his day, and who ends up sending it to London," said Pape. "By the time the person in Washington comes into work the next day, the document has gone through two iterations. That allows us to respond to customers and potential customers a lot faster than our competitors can."

VeriFone's emphasis on fast, electronically driven turnaround has led to an official ban on all internal paper transactions. Everything from hiring to large capital expenditures to travel arrangements is handled through an array of electronic forms accessible through the network to everyone in the company. "Gaining the approval to make a hire anywhere in the world typically takes about two hours, going to senior management and back," said Pape.

Also available through the network is an array of information systems that lets employees quickly get a handle on just about anything going on in the company, including corporate financial performance, the status of any project, manufacturing operations, inventory, order status and personnel matters. Employees who want more-detailed information can pull it down themselves, within the limits of their individual authorization. But in keeping with the company's philosophy of breeding well-informed employees, authorization tends to be broad. "The average employee here knows more about the company than most other companies' CEO staffs," said Pape. "We allow so much access to our financials that about a quarter of the company is registered with the SEC as insiders."

TECHNICAL PROFILE

VeriFone Inc. manufactures hardware and software for automated credit card authorization systems and other transaction automation applications. Headquartered in Redwood City, Calif., the company employs approximately 1,200 people and has annual revenues of about $150 million.

Large and Midrange Systems: VeriFone operates a global network of Digital Equipment Corp. VAXes, including a 6420 in Honolulu; a 6410 in Costa Mesa, Calif.; a 3900 in Taipei, China; a 3400 in Bangalore, India; and 10 MicroVaxes at other locations around the world.

End-user Computing: About half the employees have terminals tied into a VAX; the other half have PCs, all of which can be tied into any of the VAXes. The company had standardized on PCs from Dell Computer, but is now standardizing on DEC PCs.

Software: The VAX network runs the VMS operating system; applications include Maxcim computer-integrated manufacturing software from ASK and Tolas distribution and financial software from GSI-Transcom.

Networks: All of the company's VAXes are tied together via DECnet over leased lines, including a 64K-baud backbone. The lines also support digitized voice and a bridge network for the company's various local area networks.

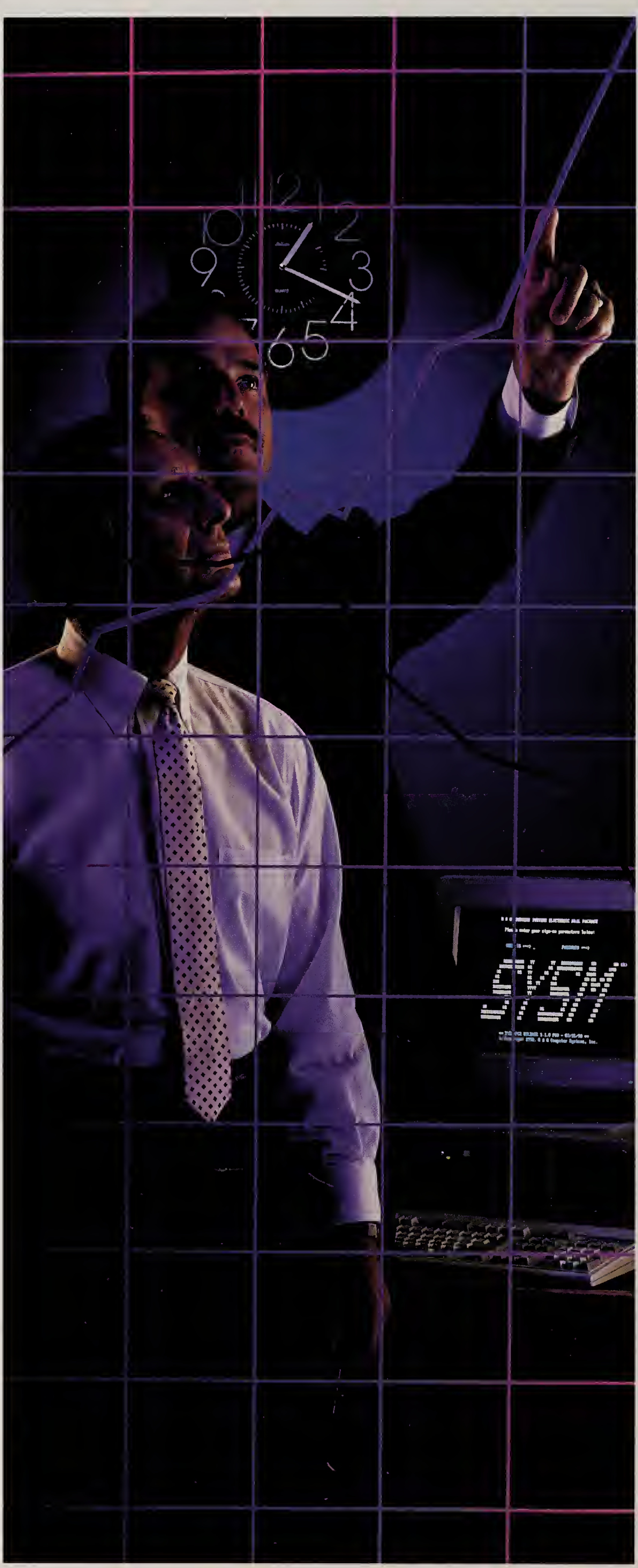
Pape is overseeing the development of a planning system that will help better integrate and manage the company's diverse functions. "Most companies' planning is too static," he explained. "We're looking for a dynamic tool that will show the interrelationships of very complex projects, down to the financial and personnel implications of every detail for each department. If we had that we could play the game of retargeting the company on a weekly basis, if that were appropriate."

Also on the drawing board is a personnel system that will search out employees based on a required skill set. Pape relies heavily on prototyping to develop such systems, but he eschews the joint application design, or JAD, approach of group requirement definition sessions. "We use a more targeted approach," he said. "We carefully track what each one of our users does or doesn't do with our existing systems, so that we've developed a good sense of what each individual is looking for. Then we supplement that with one-on-one interviews."

Tyabji claims that the ability to apply IT effectively is VeriFone's greatest competitive edge. And not all companies would want to match it. Success has its price, and in VeriFone's case the fast-moving, tightly linked electronic culture has created something of a pressure-cooker environment that has led to an 18 percent annual turnover rate. "There's a tremendous amount of intensity here," conceded Tyabji. "People expect answers, and they expect them pretty damned soon. We're a real-time company, and that's a difficult environment to maintain."

Pape agreed that the IT-driven intensity can be a problem but noted that VeriFone employees aren't likely to log in less often because of it. "When 35 percent of the company is interacting on the system at any given time, you have to recognize that's where things are happening," he explained. "To a large degree, that's where we do business." In spite of the impact of these systems, Pape isn't ready to declare his work as CIO a success. "On a scale of one to 10, where 10 represents information systems that provide maximum effectiveness, I'd give us a three or four," he said. "We may be ahead of everyone else, but you don't want to play the game of only measuring yourself against others. Relativism leads to complacency, and complacency leads to destruction. We feel we're racing against the clock." CIO

Dave Freedman is a freelance writer based in Brookline, Mass.



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TEAM TECHNOLOGY

BY MEGAN SANTOSUS

A consortium of IT vendors is proving that the spirit of cooperation lives, even in the super-competitive world of U.S. industry

When thinking of such formidable industry players as Digital, NCR and Hewlett-Packard, words like competition and rivalry come rightfully to mind. Yet these and other IT vendors have one surprising thing in common that belies their status as competitors. As members of the Microelectronics and Computer Technology Corp. (MCC), an Austin, Texas-based consortium, they are collaborating on research in the hopes of developing profitable IT products.

There's nothing trailblazing about the concept of consortia. Under the tutelage of the Ministry of International Trade and Industry, the Japanese have been enthusiasts for years, and the Europeans are making strides with groups like the Eureka Software Factory, a five-nation, 14-company group aimed at improving software development and maintenance. Even U.S. industry has long participated in informal consortia through such organizations as technical societies, which often publish research papers, and university affiliate programs, where several companies sponsor research.

Yet the notion persists that American companies cannot, or will not, collaborate with each other. MCC, by its very existence, refutes that perception. While there is "occasional friction among some members," according to Craig I. Fields, MCC's president and CEO, he maintains that the spirit of cooperation is paramount. "Our shareholders collaborate on competition-free research at MCC," he said, "and then compete like crazy in the marketplace afterwards.

"The very nature of the high-tech industry is ideally suited for a consortium," Fields said. "It's the best way to support risky, longer-term research and cut down on duplicating efforts."

Furthermore, he added, many projects—such as object-oriented parallel programming—are inherently multicompany efforts, and a con-

CRAIG FIELDS: *Shareholders collaborate on research, then compete in the marketplace.*

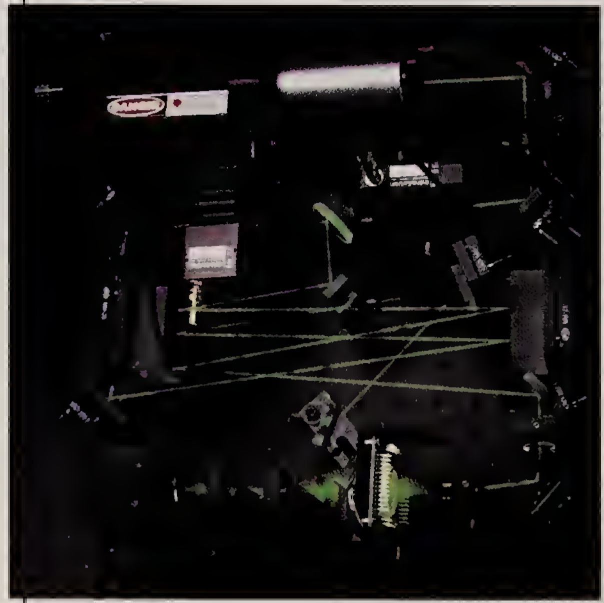
PHOTO BY STEVE PUMPHREY

> *"The very nature of the high-tech industry is ideally suited for a consortium. It's the best way to support risky, longer-term research and cut down on duplicating efforts."*
>
> *–Craig I. Fields*

sortium is the only practical way of coordinating research.

The federal government still isn't convinced that consortia can provide an effective alternative to the traditional, entrepreneurial, go-it-alone approach. According to MCC, only 1 percent of federal R&D dollars is spent on funding consortia, compared to 6 percent in Europe and 4 percent in Japan.

Fields has had personal experience with consortium-shy federal officials. He moved to MCC a year ago from a research post at the Pentagon's Defense Advanced Research Projects Agency (DARPA) after reportedly clashing with the Bush administration over the extent of the government's role in high-tech research. (Fields has long been a proponent of federal support for advanced, dual-use technologies, while many administration officials believe DARPA should concentrate its efforts on basic military applications.)



MCC *brings together technical, financial and human resources to work on such projects as multichip modules (right) and a storage system that creates holographic data images (above).*

PHOTOS COURTESY MCC

The private, for-profit MCC became one of the first American high-tech consortia when it was formed in 1982. Initially the 10 founding companies were responding to Japanese efforts in fifth-generation computing. Over the years the technical agenda has expanded beyond artificial intelligence to include projects in such leading-edge technologies as neural networks, holographic data storage, superconductivity, multichip modules and parallel systems. Currently the board of directors is working on defining a new technical vision to guide MCC through the '90s.

Since its inception, MCC has enjoyed steady growth. Currently there are 22 shareholder companies, each of which has invested $250,000 for an equity stake in the organization. These shareholders make up the board of directors and the technical advisory board, and they are required to participate in and share the costs of at least one research program. In return, shareholders receive royalties from any technologies licensed to third parties. There are also 34 associate members; these pay an annual fee of $25,000 to monitor ongoing research. Associates can fund projects and use any resulting technology, but they do not have governance rights. Any North American-owned information technology company is eligible to become either a shareholder or an associate.

"The strength of MCC lies in its shareholders," said Fields. "They run the gamut of the information technology industry, from semiconductors to telecommunications to aerospace," and include such IT heavyweights as Control Data, Motorola, National Semiconductor, Northern Telecom, Eastman Kodak, General Electric, Westinghouse, Bellcore, Andersen Consulting, Harris, Lockheed, Rockwell and Martin Marietta.

Despite this lofty roster, MCC has received decidedly mixed reviews. Leonard R. Weisberg, vice president of research and engineering and the shareholder representative to the MCC for Honeywell Inc. of Minneapolis, believes the consortium was destined to be something of a disappointment from the beginning because it set an impossibly ambitious goal for itself.

"MCC was started with the idea of keeping the American high-tech industry competitive with Japan," Weisberg said. "It was foolish to think one consortium of MCC's size would make any significant difference in regard to our competitive posture with anyone."

So why has Honeywell continued its association, and why have so many other prominent companies signed on? Economics pure and simple. High-technology research is a risky game, and there are never any guarantees of a payoff. Consortia like MCC offer an attractive means of leveraging research dollars because members are entitled to retain the intellectual property rights to any licensable technologies. The end result is that members may own a technology for a fraction of what it would have cost them to develop it on their own.

And Weisberg concedes that most of the early problems at MCC were caused by the same bad management that plagues many start-ups. "We lost money because the programs were run terribly in the past," Weisberg said. "But with Dove [Chairman Grant Dove, who joined MCC in 1987], and especially Fields, we have much greater faith that programs will be run better than they were ever run before."

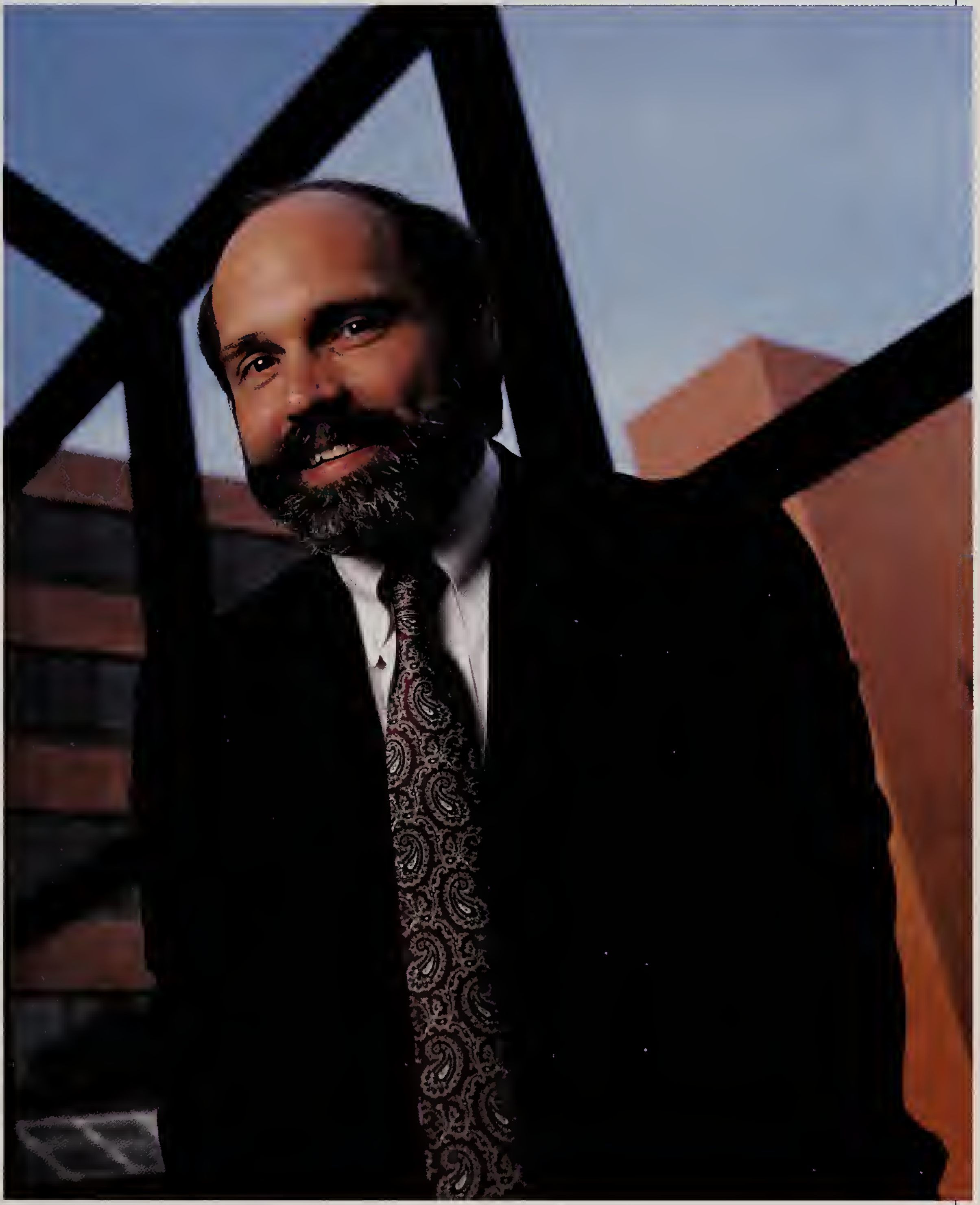
In an effort to improve MCC, Fields has developed a demanding set of criteria to review programs. These criteria take an especially hard look at the feasibility of the technology-transfer process. A recent study was also conducted to determine why past programs failed and how MCC can better select future projects. Such efforts, according to Weisberg, are a significant step in the right direction.

Pursuing research that is relevant to members is obviously MCC's biggest challenge. Ideas for programs are generated by both the shareholders and MCC's full-time staff of resident researchers. "The final litmus test for deciding if a project is adopted is whether or not it will give business advantage to our shareholders," said Fields. According to Fields, approximately 15 percent of the 300-plus research staff are so-called assignees—representatives of shareholders working on-site on specific projects. Current research projects are organized into five main programs: Advanced Computer Technology, Software Technology, Superconductivity and Optics in Computing, Computer-Aided Design, and Packaging/Interconnect for greater chip densities. Members provide the bulk of the $60 million budget, with additional funds coming from license fees, government grants and the sale of MCC stock.

T.J. Rodgers, president and CEO of the unaffiliated Cypress Semiconductor Corp., is an outspoken critic of consortia like the DARPA-supported Sematech where the federal government has the power to select specific projects and thereby determine the winners and losers. He believes MCC's aproach has a more realistic chance of success because the members themselves proactively participate in the research and are therefore the primary beneficiaries of any profits.

As far as CIOs are concerned, Fields doesn't think that MCC figures prominently, nor that it should. "There's no question that over time, every technology becomes available," he said. "The issue is who gets the most soonest, and that's our members." In other words, intrigued CIOs shouldn't hold their breaths waiting for MCC technology to appear at their doors. Yet it stands to reason that CIOs as consumers will certainly benefit if their vendors are more technically innovative and competitively savvy.

One criticism leveled at MCC in the past is that no revolutionary technologies have originated there. While it's true that MCC research has not grabbed industry headlines, more than 150 of its technologies have quietly been transferred to members or



GENE PIERCE: *"The value of NCR's intellectual property has increased as a result of the collaboration with MCC."*

PHOTO BY ANDY SNOW

STUART WOODRING: *NCR's Cooperation represents a ground-breaking development.*

licensed to third-party vendors. Now NCR should quell such criticism once and for all with the release of a new product developed with the help of MCC technology. Cooperation, an enterprisewide integrating computing environment, combines the concepts of object-oriented technology, the client/server model and open systems into a single software product allowing users to integrate applications and information across multiple servers and workstations. According to NCR, Cooperation will lower hardware costs, reduce communications costs, increase user productivity and facilitate faster application development.

Gene Pierce, a senior consulting analyst in NCR's software technology R&D division, believes his company's association with MCC played an integral part in making workflow automation a viable component within Cooperation. "While working on a project called System '90 for office automation I heard about MCC's coordination technology research," Pierce recalled. "It occurred to me that incorporating MCC technology into our project might help us with what we were trying to do."

Pierce and NCR were developing a comprehensive environment for cooperative computing and striving to get a product out the door as soon as possible. "Organizations were becoming flatter," Pierce said. "There had to be some technology that would support this change as well as provide a reduction in cost and complexity."

System '90 was an AI-based project that automated the generation of forms within an organization. Pierce believed that MCC's coordination technology research was one of many key technologies that would enable such forms and other information to move seamlessly along a PC network. Pierce spent two years working with the business unit and MCC on technology transfer. The result can be found in Cooperation's Workflow Automation tool, which will be a major component of NCR's approach to cooperative computing.

Stuart D. Woodring, the director of software strategy service at Forrester Research Inc. in Cambridge, Mass., believes that Cooperation represents a ground-breaking development. "It's going to allow companies to truly realize the promise of office automation," Woodring said. "NCR has taken a couple of the most important activities in the computer industry and tied them all together into something very snappy."

Pierce acknowledges the value of participating in MCC, both in terms of timeliness and financial gain. "It would have taken a lot longer to introduce this product without MCC," said Pierce. "We could have done it, but we would've missed the window of opportunity. We could have gone down another route, but this approach allowed NCR to own the technology." Pierce also said that "the value of NCR's intellectual property has increased as a result of the collaboration with MCC. These are the kinds of things that are creating value for our customers and ourselves."

As for the future, Fields asserts that MCC's overall mission—to improve the competitiveness of its members by supporting applications-driven research that can be transferred into profit-generating products and services—will not change. To achieve this, Fields would like to make MCC more efficient and dispel some of the early criticism.

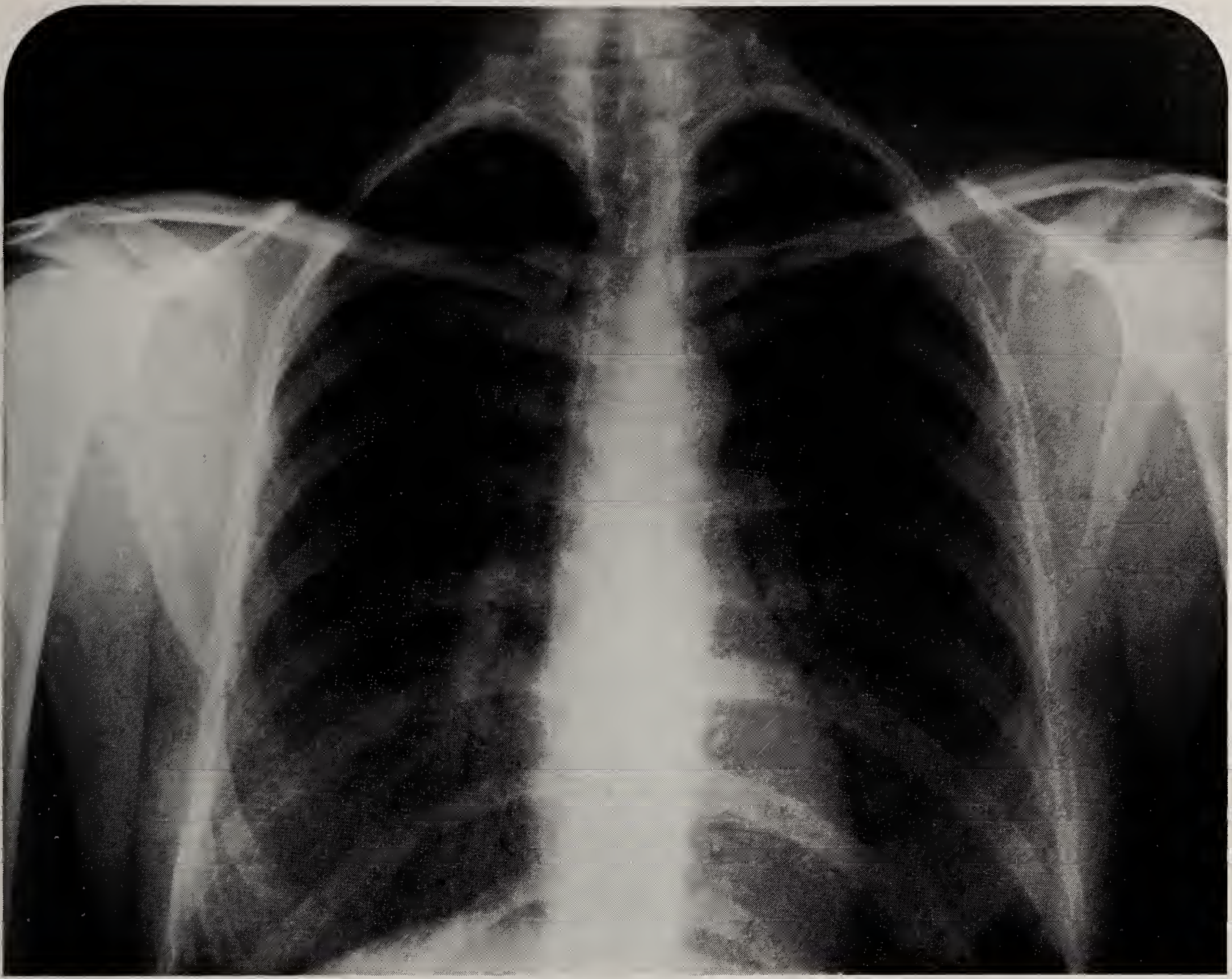
"I'd like to run MCC more like a business, paying attention to deliverables, receivables, and using innovative business practices," he said. Another of Fields's ongoing priorities is to increase the number of assignees from member companies because he believes it will improve the technology transfer process as well as enhance individual careers.

In February, Evolutionary Technologies Inc. became MCC's first spin-off company. ETI, also located in Austin, will develop and market data conversion products resulting from MCC's EXTRACT research project. Fields would like to see more spin-offs, which he considers one of the most effective ways to transfer technology to members.

Fields would also like to attract more members. "Right now, not every skill is represented, and we have to contract out for a lot of skills that we don't have." Interested IT companies are invited to get in touch with any member of MCC's staff. The process for becoming an associate is rather informal, consisting of mutual site visits and an exchange of personnel. Shareholder members must be approved by the board of directors.

Given that MCC's ultimate value should be measured by its impact on its membership, Honeywell's Weisberg expressed cautious optimism. "It's not only that you select the right programs," he said, "but that you run them right. And I think MCC is doing a better job on both."

PHOTO BY JOHN KENNARD



If a doctor can't find asbestos damage here, a lawyer will.

These days, asbestos litigation is fast becoming a giant grab bag. And nobody's grabbing more than America's personal injury lawyers. These opportunists are rounding up workers all across the country, herding them into vans equipped with x-ray and breathing machinery, and examining them for traces of asbestos-related disease.

The lawyers who invented this screening technique brought suits in 12 states on behalf of 8,000 tire workers. Yet in a May 1990 opinion, a Kansas City district judge called their litigation project "a professional farce…The process makes a mockery of the practices of law and medicine."

As Forbes pointed out in a February 18th cover story, it's not just lawyers that are at fault, but the vagueness of the law itself. Consider the case of a mechanic who had occasional contact with tractor parts containing not-so-dangerous chrysotile asbestos. When he died from cancer, lawyers saw to it that his wife received a large settlement from the companies that made those parts. But in all likelihood, his death was caused by deadly amphibole asbestos, which he was exposed to when he worked at a naval shipyard during World War II.

Right now, the U.S. has 115,000 pending asbestos cases. Forbes has learned that between 65% and 80% of the claimants involved in them have symptomless maladies unrelated to asbestos. Then why is it that asbestos claims have already forced 15 companies into bankruptcy? And why is it that litigation could end up costing companies, and their insurers, as much as $100 billion?

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Data in the Round

As an immense data repository and cost-effective publishing medium, CD-ROM may be the answer to many companies' information dilemmas

BY DANIEL P. DERN

CD-ROM—compact disk/read-only memory, an emerging storage medium based on the same technology that has more or less supplanted vinyl in the recorded-music industry—offers solutions to many of the information distribution problems that CIOs face.

Consider: For something that's theoretically intangible, information often presents some very physical problems. Documents and books take up space. A company's product catalogs can fill a four-foot bookshelf—and need monthly updating. Tapes and floppy disks get zapped by magnetic fields, dirt and wear and tear—hardly optimum for something that travels by post and courier. Users unwittingly alter or erase software and reference data. Bulk mailings of manuals cost huge sums. Inserting change pages in documents is a nuisance.

Many of these problems can be solved by CD-ROM. And as many companies have discovered, CD-ROM may also be a new product or service direction, generating profit centers in the middle of cost centers.

The installed base of CD-ROM devices among users has reached what many vendors consider critical mass. In 1991 reader sales will hit a million units, bringing to 1.8 million the number of CD-ROM readers installed in computing systems (not including games or automotive navigation aids), according to Edward Rothchild, president of San Francisco-based Rothchild Consultants. By 1994 annual sales will be 4.5 million units, and the cumulative installed base will exceed 11 million, Rothchild predicts. Tandy and other PC vendors offer desktop systems with CD-ROM drives; GRiD Systems Corp. has just announced the industry's first laptop that includes a CD-ROM reader, the 17-pound GRiDCase 1550cd. More than 2,000 commercial CD-ROM titles are available, and that does not include custom or in-house CD-ROM disks.

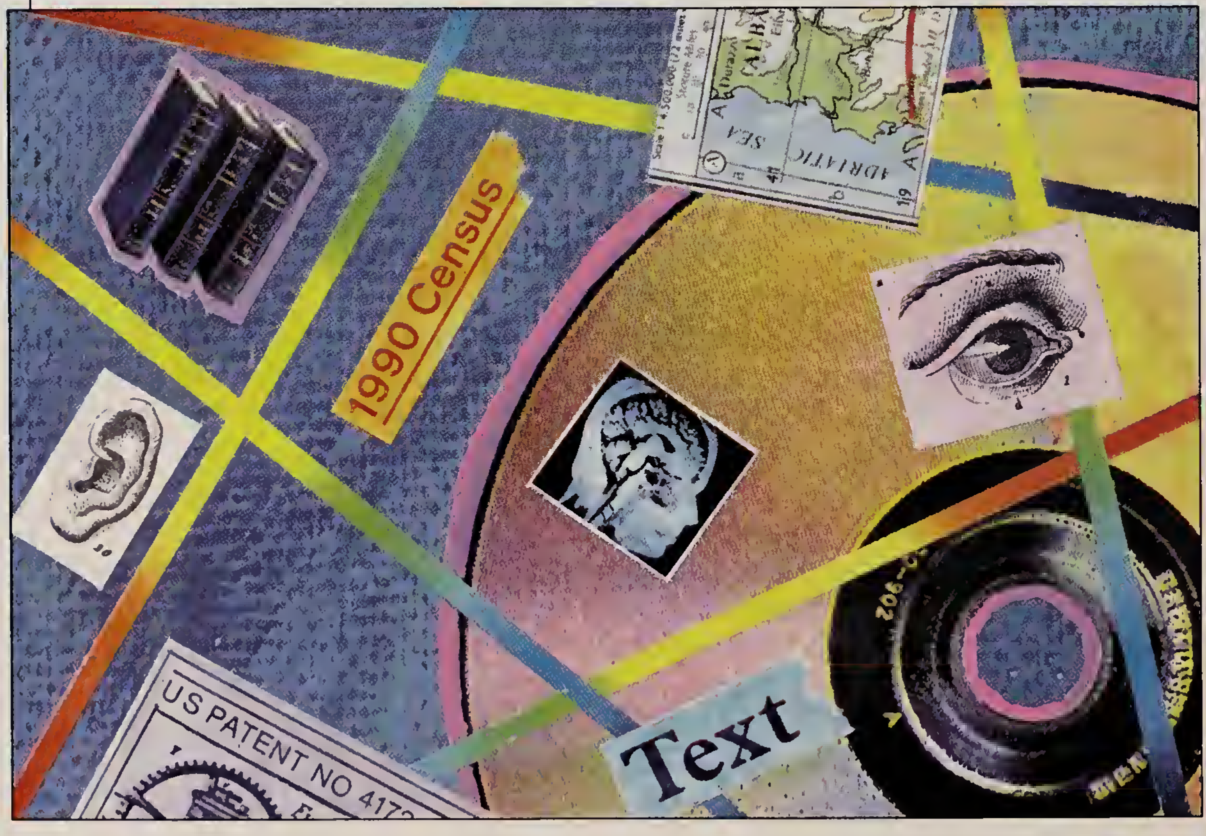

ILLUSTRATION BY ALAN MAZZETTI

CD-ROM is an optical medium: Its drive reads information by using laser beams to scan the disk, as opposed to the magnetic heads used by conventional hard- and floppy-disk drives. An audio CD holds about 72 minutes of music (the length of Beethoven's Ninth Symphony, on which the initial format and size decisions were based).

That same 120-millimeter CD holds about 650MB of data—any combination of text, source and executable program files, numeric and spreadsheet data, or images and audio in digitized format, photos, illustrations, fonts, bit mapped pages and graphs. As a repository for computer data, one CD-ROM disk can hold two dozen volumes of an encyclopedia, or source code for a Unix operating system and a dozen midsize applications. Some of the space goes for error correction codes, and perhaps more for indexing—but that leaves a lot of room for data.

Used for ASCII text, a single CD-ROM disk can hold the equivalent of a quarter-million single-spaced typewritten pages. Most CDs, one analyst estimates, use at most a quarter of their available space.

Whereas floppy and magnetic disks are seen as parking spaces for active and transient data, and optical disks as longer-term archival storage, CD-ROM is a medium for delivering information—publishing and distributing it, and making it available to computer and network users.

> *Using in-house resources or a service bureau puts CD-ROM publishing technology well within reach of most organizations.*

Used with a computer, CD-ROM provides a way for systems users to access data—lots of data. But the real power of CD-ROM comes into play as applications let users search through indexed databases and across hypertext links, getting powerful combinations of text, images and further cross-references. The software that accompanies data incorporates search functions as well as the user interface to present what it finds.

CD-ROM can provide access to the *Oxford English Dictionary*, to libraries of fonts for desktop publishing and to Microsoft Bookshelf, which contains 10 of the most popular office reference works, including *The American Heritage Dictionary, Roget's II Electronic Thesaurus, Bartlett's Familiar Quotations* and the *World Almanac and Book of Facts.* Even the government is providing information in CD-ROM format—the 1990 United States Census, five million patents from the Patent Office, and more than two dozen other major applications and databases from assorted government agencies. For users on the move, CD-ROM-equipped laptops can access actuarial tables, maps, medical databases, sales catalogs and other useful data.

Understanding some CD-ROM characteristics will help you decide if they fit into your organization's information architecture:

Read-only. Unlike WORM (write-once, read many) disks, the contents of CD-ROM disks cannot be written to, changed or erased. Today's CD-ROM drives, likewise, are read-only devices. (Write-once and rewriteable optical disks are outside the scope of this article.)

Random access. Like floppies and hard disks, and unlike tapes, a CD-ROM drive can get to any piece of data relatively quickly. Not as fast as a hard disk, perhaps—but faster than a tape drive or than flipping through a book.

Nonvolatile. The information pressed onto CD-ROM disks is impervious to the weaknesses that most computer storage media are heir to, most notably electromagnetic fields and dirt. You can put them on top of magnets, carry them through airport security, spill coffee or cigarette ash on them—and the data will still be there.

Small physical size. A single CD-ROM drive is the size of a Discman portable audio CD player. A "tower" of even a dozen drives is about the size of a personal coffee maker.

Shareable. CD-ROM drives on your network can be accessed by all network users; depending on the device, several users may be able to use the same disk at the same time.

Convenient. Many CD-ROM programs can be accessed from within Microsoft Word, Lotus 1-2-3 and other popular word processors, spreadsheets and databases.

Mega-consultant Arthur Andersen found CD-ROM so useful that it turned an internal service into a product. Citibank uses CD-ROM to send daily updates to its clients. The Royal Bank of Canada sends daily updates of transactions and accounts to its 1,500 branches across Canada via CD-ROM. CD-ROM can also become a major communications and sales tool. Freestanding CD-ROM desktop PCs can be a worthwhile investment, if they make it easier for customers to find and order products, for example.

One exciting use for CD-ROM is as a publishing medium. Your organization may itself have information best suited for distribution via CD-ROM for internal use or dissemination to clients. Using in-house resources or a service bureau puts CD-ROM publishing technology well within reach of most organizations. Turning "ready data" (gathered, indexed and consolidated onto a single tape) into the glass master used to stamp copies usually costs $2,000 to $2,500. After this point, 50 or more copies of the CD-ROM disks will cost $2 to $3 each.

The phase of production likely to be most expensive—and the hardest to predict costs for—is the actual gathering of information. This may need to be researched, written, scanned or keyed in, or it may already exist in electronic, online format. Unless you're only using CD-ROM for distribution you'll also need software to provide the user interface and then work with the on-disk data. (There are numerous "authoring" packages available to help create this software.)

Mike Befeler, marketing vice president at Reference Technology in Boulder, Colo., a CD-ROM software house and service bureau, listed typical characteristics of data for which CD-ROM publishing is appropriate:

- Involves 25MB or more data
- Will be copied 25 or more times (but can be as few as one or two

copies using CD-WORM systems)

- Requires direct (random) versus sequential access to data
- Mixes several types of data—text, sound, image
- Consists of read-only information that may be periodically updated—for example, medical or legal databases or telephone directories

> *CD-ROM disks can reduce your organization's use of often-expensive dial-up database services. CD-ROM renders data immune to tampering—and makes your software safe from viruses or worms.*

It's possible to bring the entire job in-house. Meridian Data Inc., in Scotts Valley, Calif., offers a turnkey system starting at $32,500 that includes authoring software and a Yamaha recorder and can make one CD-WORM disk at a time. That's hardly a production run, but it's enough for in-house prototyping and certain other needs. Sony and other vendors also sell multiple-writers, which write to a dozen or more disks in parallel.

And for organizations loath to let sensitive data beyond the door, systems like the Sony Once-Write offer a secure mechanism for publication.

Fortunately, your IS department doesn't have to do it all internally. Many steps can be farmed out to service bureaus, or to vendors and VARs who are entering the service bureau business for portions of the CD-ROM publishing process, including creative services, scanning and conversion, premastering and even small production runs.

Even if you don't anticipate producing CD-ROM-based data or applications, the odds are high that there will be some CD-ROMs spinning at your site—for computer programs and manuals.

Vendors including Digital, Hewlett-Packard, IBM and Sun Microsystems are turning to CD-ROM as a distribution medium for software and documentation, in many cases phasing out tape or other media. CD-ROM drives will be standard or optional features in most new workstations, and many vendors are bargain-pricing reader units to encourage users to retrofit them into existing systems.

Replacing tapes and printed documents with CD-ROM means big savings for vendors—and less hassle for users. New software samples and demos will also come your way via CD-ROM. Through its CDware program for Sun ISVs (independent software vendors), for example, Sun will make available executable demos or password-protected copies of ISV programs.

"A software CD will typically hold about 60 packages, averaging 10MB each," said Dana Gauthier, senior product manager at Sun. "Our first CDware release will have 23 companies represented, including Lotus, Frame, Interleaf, Word Perfect and Wingz."

Bob Katzive, vice president at Disk/Trend Inc., a Mountain View, Calif. market research firm specializing in the disk drive industry, anticipates more and more companies using CD-ROM drives as a network resource. "Many companies are still evaluating whether the titles they need are available," he said. Hardware evolution has stabilized, Katzive suggested, although there's still movement in the low-end writeable CD drives.

There are pros and cons to putting CD-ROM devices on your network, rather than attaching them directly to individual PCs and workstations. Networking may reduce access, or the perception of it. You'll need a drive for every active disk—if users have to phone the corporate MIS library and request their CD-ROM disk to be loaded in, the net response time is unacceptably long. The wait may be even longer for popular disks.

But the benefits of networked CD-ROM are inarguable:

Network resource. The cost of even a tower, as a network resource, amortized over your entire user base, makes it readily affordable.

Enhanced security. CD-ROM disks, and the readers themselves, are relatively small and easy to steal. But a network device can be sited within a locked MIS facility.

CD-ROM disks can reduce your organization's use of often-expensive dial-up database services. CD-ROM renders data immune from tampering—and makes your software safe from viruses or worms.

According to Rothchild, the new formats coming to market, including the 86-millimeter OROM (optical read-only memory) demoed by IBM, Sony and MOST, with a capacity of 128 rewriteable megabytes, or 122 read-only megabytes, are bound to open up more applications. The 86-millimeter OROM, for example, will give shorter access times and faster sustained data transfer rates; we'll also see hybrid optical disks, with both read-only and rewriteable areas on the same disk.

The decision to use CD-ROM, experts agree, is no longer a technological question but a business one: Are the applications and data you want available on CD-ROM, and is CD-ROM the appropriate vehicle?

One other consideration, not to be underestimated: CD-ROM drives at the workstation level offer an important benefit to programmers—they can be used to play Grateful Dead CDs when not otherwise tied up.

Daniel P. Dern is a Watertown, Mass.-based freelance writer specializing in technology and business.

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VOLUME TWO
NUMBER TEN

TRENDLINES

DON'T FORGET THE NAILS

For the weekend renovator unaccustomed to drawing up workable plans and estimating and selecting building materials for do-it-yourself projects, the Weyerhaeuser Co. is now offering one of the more interesting computer-based kiosk applications.

Weyerhaeuser's DesignCenter, which debuted recently in building-supply and home-center stores, automates the project design and estimating process. While the marketing aim is to boost sales and employee productivity at the retail outlet, the added value to the do-it-yourselfer is in time, money and aggravation saved.

The system is fast (10 to 15 minutes to design a deck) and accurate (providing exact materials costs). Currently the kiosks are programmed only for decks, but garages, shelving units and other projects will be added to the system soon.

To operate the kiosk, a store employee uses a simple trackball device to prompt the customer through the design. Customers can opt for a deck that is either attached to the house or not, anywhere from ground level to six feet high, with one level or two.

Once the dimensions are set, the customer chooses the type of decking and the direction it will run in. A variety of railing styles are offered, with different balusters and headers, depending on the customer's tastes and budget. The system automatically sets the correct joist, beam and support-post placement.

Finally, when the design is complete, the system displays a detailed, 3-D image that can be manipulated on screen to show any angle, top to bottom, right to left. Another prompt shows the cost of materials for the current design. Too expensive? Try a simpler baluster style or trim down the square footage—then compare the two designs and costs side by side.

When the customer chooses a final plan, the DesignCenter prints out a 3-D color depiction of it, along with construction details, an itemized materials list (with current prices) and a "how-to" booklet on basic deck construction. (These are usually available only with the purchase of the project.)

The DesignCenter, which has been nominated for the *Computerworld*/Smithsonian awards for technology innovation, is the product of Innovis Interactive Technologies, a subsidiary of Weyerhaeuser. The kiosk was created, said Innovis President Mark Lembersky, as "a way to provide a value-added [service] to retailers that would help improve the store's image and sales and, at the same time, deal with the shortage of skilled workers on the store floor." Lembersky called the kiosk "remarkably easy to use," and reported that "almost all salespeople become proficient in 15 minutes."

ILLUSTRATION BY HAL MAYFORTH

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Three firms' MIS operations find their application-development efforts streamlined through the use of a variety of CASE products

CASE BY CASE

1 AMERICAN TELEPHONE
& TELEGRAPH
Parsippany, New Jersey

With the upheaval of divestiture ca
the usual workload, AT&T's IS grou
design tools to iron out data incon
speed development.

BY MICKEY WILLIAMSON

The 400 information
systems profession-
als at American
Telephone and
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in 1985 were pract
cally reeling from the effects of dive
titure. The services division was
sponsible for some 20 ma
systems, and legal requirement
the Bell system breakup meant
computer systems had to be br
online in less time than
thought possible, with fewer
available to do the work.
"We were experiencing
force cuts [and] diminished
and still we were having
and maintain systems
brought up even faster tha

in each of 35 different applications. It's hard to imagine a situation more fraught with danger, especially when people were feeling overworked and threatened by massive structural change.

The organization was already committed to a structured analysis methodology, and Cooper had been dreaming for more than 10 years of a software system that would get the development process under control. He held some informal talks among his peers, then put together a group to analyze requirements and develop specifications for an analyst's support tool. "It got to be too much; we wanted a Rolls-Royce," Cooper said. He knew he'd never be able to justify the cost of building such a system in-house, so he began instead to survey the field of available tools.

He decided that Excelerator, produced by Index Technology Inc. of Cambridge, Mass., seemed to meet a good portion of the organization's requirements, so he sent for a demonstration diskette, tried it and then
alled in an Index Technology sales
uss the product's limits
ans for the fu-
ooper

Cooper and Kearns tapped Bouldin to be their spear carrier—to introduce the application and build support for its use within the programmer/analyst community. Kearns told her: "You're a missionary and you're on a crusade. Go forth."

Bouldin put on what she called "a marketing blitz." She gave demonstrations, using data that was "fictitious but familiar. I put it in terms people could relate to, in terms of their own self-interest.

"I also did a lot of networking," she continued. "Somebody would walk past my office, and I'd yank them in for a demonstration. I wanted to touch base with as many people as would give me some of their time—find out what was inherently productive in what we were already doing, what people liked about the current

ARA BOULDIN: a spear carrier and missionary for CASE within AT&T

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CASE BY CASE

AMERICAN TELEPHONE
& TELEGRAPH
Parsippany, New Jersey

Group Dynamics

IS managers experimenting with self-managing teams are learning a profitable lesson about the correlation between power sharing and productivity

BY RONALD B. BARTON

A year ago, Gil Urban, IS director for Whirlpool's North American Appliance Group, embarked on a campaign to build a high-performance organization based on self-managing teams of empowered, highly committed individuals. Urban's goals were ambitious: to guide Whirlpool's manufacturing, distribution and sales organizations toward shared, cross-functional systems; to show customers more powerful ways to use IT; to attract and hold business-oriented IS professionals despite salary constraints; to increase systems development productivity; and to accomplish all this without adding head count to the organization.

Urban is not alone in his goals or in the method he chose to achieve them. IS organizations striving to improve productivity and customer service are reaching beyond CASE and other development techniques to create fundamentally new work practices and ways of managing. And self-managing teams are one of the most popular, according to a CSC Index Inc. survey. Pioneered in the 1970s, self-managing teams in manufacturing plants have achieved productivity gains ranging from 30 to 250 percent.

Self-managing teams assume many of the responsibilities traditionally held by management. They hire, train and assign new employees, determine work schedules, provide instruction in various skills and may even make decisions about such sensitive areas as bonuses and firings. When team members identify problems they take actions to solve them, rather than deferring to a supervisor. As a result, successful teams produce employees who are knowledgeable about their organization's direction, highly motivated and committed to achieving ambitious goals.

IS organizations could benefit tremendously from this type of structure. Self-managing teams not only improve motivation and investment—they also increase the organization's speed and responsiveness by reducing bureaucracy.

Since few IS groups have experimented with self-managing teams for more than two years, long-term results are uncertain. Nonetheless, some lessons are already emerging from these early efforts.

The first lesson is the need for strong leadership. Before any payoff from self-managing teams, departments must invest significant amounts of time and money, and will probably experience some negative effect on productivity. The head of IS and his or her boss must be sufficiently committed to the project to see it through these initial difficulties.

Ironically, along with the need for strong leadership comes the requirement that managers shed some direct control. By definition, self-managing teams are not conducive to traditional, autocratic management styles. Supervisors must relinquish control over details, concrete problems and day-to-day activities in favor

ILLUSTRATION BY PHILIP ANDERSON

of broader responsibilities such as planning and ensuring that teams are adequately supported and directed.

The challenge to managers lies in finding the right level of delegation without abdicating their own accountability. They must allow the team to define its specific responsibilities while ensuring that those responsibilities are aligned with corporate goals and are in fact being met. One way to ease the minds of supervisors—who may fear the newly liberated organization is veering off-track—and ensure that responsibility does not vanish into the gap between old management and new is to set in place a clear system for measuring progress. Good performance measures also enhance motivation by allowing teams to track their progress.

The best measures come from customer or business activities, such as cost or quality improvements from new systems modules or customer satisfaction ratings. Discussions with customers produce new targets that can be incorporated into team and individual goals. One rule: Never set individual goals and incentives that conflict with those of the team.

Another lesson: Getting off to a good start usually requires that employees be involved as quickly as possible. Employees who participate in the early stages of team management have a stronger understanding of the vision guiding the organization and are better prepared to help implement the program.

At Whirlpool, for example, Urban began by forming a planning team. When the planners found that other employees were eager to contribute, they used lunch groups and paper and electronic bulletin boards to encourage input. Another company used workshops that successfully reached out to some 300 employees.

Organizers must also establish credibility early. Planning groups can win trust and attain stature by attacking some problem that may be generally recognized but not openly discussed (for example, a lack of trust between members and a manager). These represent opportunities for "quick hits"—speedy, visible solutions that begin breaking down resistance and skepticism.

Creating a vision is another early process that promotes group cohesion and individual investment. Team members work together to define the desired business role of IS and develop strategies for fulfilling that role. The team should also establish principles: simple, direct statements of the beliefs and values of the organization, and how those beliefs and values affect the practical workings of IS.

> *Planning groups can win trust and attain stature by attacking some problem that may be generally recognized but not openly discussed.*

A statement of principles might read: "We value skills in three areas—technical, management and business. Each individual will have general knowledge in each area, and specific expertise appropriate to team needs." The implication of these principles: "The IS group requires current knowledge of business strategy. No one can be just a technologist."

The experience of formulating such a principle is as important as the principle itself. Participating team members have a stake in the product of the discussions—or heated arguments—that occur as people confront each other with strongly held beliefs about what they want for their organization. The experience creates motivation and builds good relationships. And it produces a commitment to the vision and to other team members that a proclamation handed down by the CIO could never achieve.

The ability to work together is the hallmark of a successful team. But organizers commonly underestimate the time and effort required to build high levels of capability, commitment and trust. For example, as Whirlpool's planning group began drafting its principles, some members felt uncomfortable disagreeing with or even speaking up in the presence of their "boss," while others dominated the discussion with drawn-out arguments. As a result, after more than a day of growing frustration, the group still hadn't agreed on their first principle. After watching a videotape of a successful team, the planners realized that they hadn't achieved a level of trust or communication that would ensure they were getting at the concerns of all participants. Nor had they established common ground regarding objectives or values.

In order to build trust, the group decided to implement only decisions that received unanimous agreement. Toward that end it sought to understand the views of all members, including those who had so far remained silent. Once members realized that their views would not be dismissed, they no longer insisted that every detail of their opinions be incorporated into each decision. Gradually it became apparent that everyone's basic values were in fact very similar, and the pace of decision making picked up.

The word from those with experience developing self-managing teams is that organizations should "go slow to go fast." Take the time to develop those skills that provide the foundation for team effectiveness. Don't sacrifice thorough preparation for immediate results. Allow management from below rather than imposing mandates from above.

Once employees appreciate the potential of self-managing teams they develop a willingness to help other members and managers work through new problems. Each step moves them closer to their business goal while enhancing mutual respect and trust. And as each step is taken, as goals are accomplished and motivation grows, they begin to realize they are harnessing the power of an idea whose time has come. CIO

Ronald B. Barton is a principal at CSC Index Inc., a management information consulting firm in Cambridge, Mass.

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FYI

Sales Support

If the economy hasn't already prohibited week-long sales meetings in Tahiti, the Sales Marketing Communication System from GE Information Services may soon make them unnecessary. The SMCS is designed to allow sales and marketing staffs to be more productive by handling myriad support functions. A modular sales automation software package, when used in tandem with GEIS's worldwide communications network SMCS allows users to share and access data and applications from all over the world.

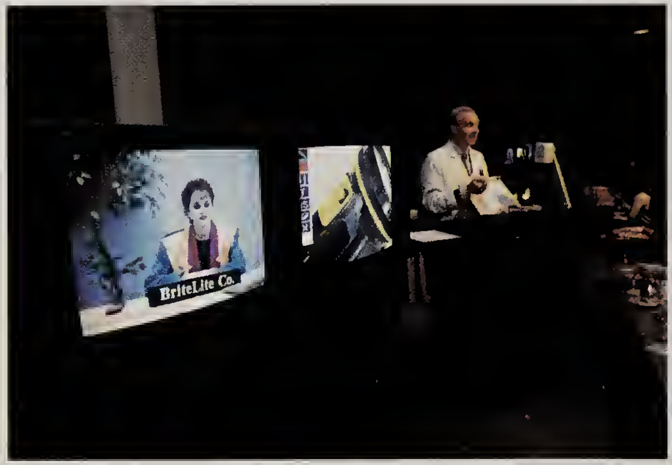
SMCS lets sales and marketing people access and update databases of information on calls, revenues, expenses, calendars, customers, prices and products, orders, promotions and contacts. In addition, users can easily produce their own reports. Sales offices worldwide can exchange forms, reports, forecasts and memos via GEIS's QUIK-COMM electronic mail service. QUIK-COMM also allows SMCS users to send faxes directly from their PCs. A bulletin board component posts general or urgent information to everyone on the network.

Prices vary depending upon number of users and services. For more information, call GEIS at 800 433-3683.

Across the Miles

VideoTelecom Corp. says its MediaConferencing system is better than the next best thing to being there.

The product was designed for the growing number of people who routinely exchange information over long distances. Like videoconferencing, MediaConferencing enables face-to-face contact between colleagues at disparate locations, but it also allows users to share data files, documents and other critical resources during remote meetings.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MediaConferencing combines several technologies, including interactive video and a full duplex audio system with speakerphone functionality. In-band fax and the company's Pen Pal Graphics and PageView facilitate the exchange, revision, printing and projection of hard copy. And a computer conferencing function allows users to interactively manipulate files, with screen sharing across long distances.

In addition, a new technology called TimeConferencing allows users to record a detailed video, audio, computer and/or document message and store it on the system's hard drive or a floppy disk for later viewing or duplication by a remote colleague.

Prices range from $34,950 to $85,000. For more information, call 512 834-2700.

A Measured Approach

A little mystery never hurt anyone, unless you're a software developer trying to figure out the cost and size of a software project. For such people, GEC-Marconi offers SIZE Plus, an estimating tool based on the function point analysis (FPA) method.

Unlike traditional sizing methods, FPA provides a precise measure of software functionality and helps managers plan more effectively, according to GEC-Marconi. SIZE Plus runs in a graphic environment using a mouse and pull-down menus and provides five different FPA methods that support both data processing and real-time applications. Available on Unix and VMS platforms, SIZE Plus runs on a variety of workstations and PCs.

After a project begins, SIZE Plus can be used to monitor its ongoing status and to collect metrics at its completion. Prices range from $2,800 for a single user to $7,300 for unlimited users. For more information, call 703 648-1551.

Little Feet

If, like us, you have a PC on your desk with a footprint as imposing as a block of stores, and you would rather have something more along the lines of a modest bungalow or bunker, Flytech Technology has been busy in your behalf. While others have worked to expand the envelope of desktop PC functionality, Flytech, based in Santa Clara, Calif., has been contracting the envelope of desktop PC size.

The result is Flytech's Carry-1 line of PC-compatibles, whose noble aim is simply to liberate desktop real estate. Each complete system comes with a scaled-down, but not cramped, keyboard (81 keys encompassing 101-key functionality) and a 9-inch monochrome or 9- or 10-inch color monitor. Each can be configured with a high-density floppy drive (or as a diskless workstation). The systems range from an XT-compatible priced around $400 to a 386SX SuperVGA system with 4MB of RAM and an 80MB internal hard drive priced around $3,000. All models include a half-card (8-bit) expansion slot for a modem or network card, two serial ports and one parallel port, and an optional LAN adapter that connects the system to a network using the parallel port.

For further information, contact Flytech at 408 727-7373.

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EVENTS

Open Systems Networking with TCP/IP

Hilton International, Toronto
September 16-18
Technology Transfer Institute
213 394-8305

This seminar is designed as an introduction for people who are new to networking and internetworking technologies, as well as for veterans searching for a broader understanding of networking. Topics include connectionless and connection-oriented protocols, TCP/IP technology and internetworking concepts. Registration fee: $995.

IT and the Corporate Agenda: People, Productivity and Profit

Hyatt Regency, Monterey, Calif.
September 22-25
CIO Publishing Inc.
800 366-0246 or 508 935-4273

Tom Peters is a featured speaker at this conference which addresses the issues of workplace literacy, work-based learning, ethnic diversity and skill competencies. Speakers discuss IT-based programs aimed at managing an ethnocentric workplace, increased productivity and employee satisfaction and motivation. Registration fee: $995.

AVIOS '91 The 10th Annual Voice I/O Systems Applications Conference

Hotel Nikko, Atlanta
September 24-26
American Voice Input/Output Society
408 248-1353

This conference includes technical sessions for systems administrators and programmers along with speech-recognition technology sessions geared to marketing professionals. There is also an exhibition featuring voice input/output vendors and demonstrations. Registration fees: $125-$425.

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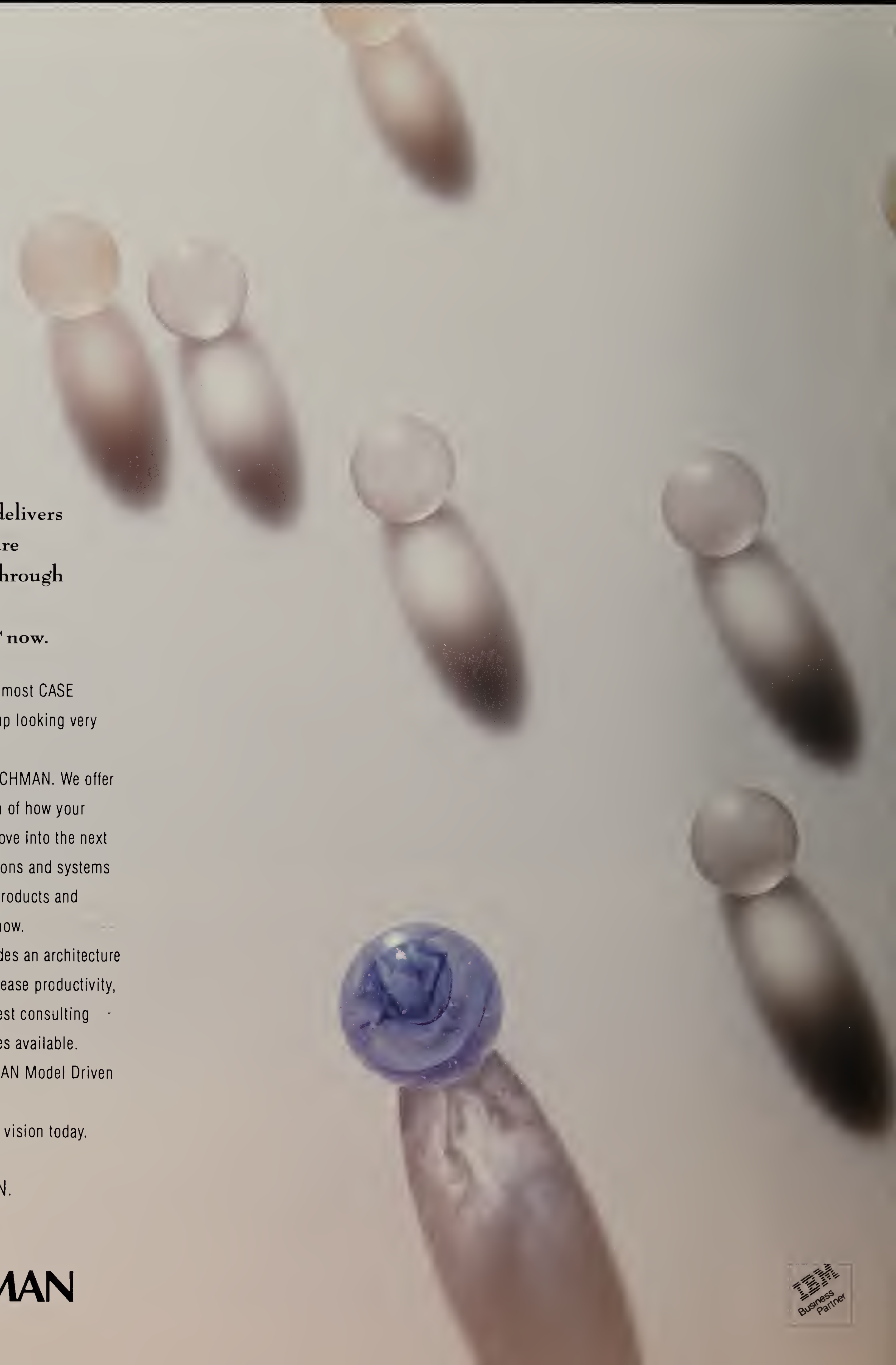

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